MONTHLY WEATHER REVIEW.

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INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States during June, 1884, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given and their approximate paths shown on chart i.

Under "areas of low barometer" are described six atmospheric depressions, all of which were of slight energy. The average number of areas of low barometer for the month of June during the last eleven years is nine—thus showing June, 1884, to have been less stormy than usual.

The most noteworthy meteorological feature of the month was the precipitation in California, where the June normal for the state is less than .10 inch, the average for June, 1884, being more than ten times as great. The monthly precipitation was also largely in excess of the average in the southern states east of the Mississippi river, while there was a marked deficiency in the states from Dakota and Nebraska, eastward.

The mean temperature of the month was below the average for June over the southern portions of the country, by from 1° to 6°; and over the northern portions it was above the average, the excess about corresponding with the deficiencies which occurred in the southern sections.

The local storms occurring during the month were numerous and severe; they were generally accompanied by very heavy rains, which resulted in much damage to agricultural and other interests.

The weather over the north Atlantic ocean during June was generally fine, the month passing without the occurrence of severe storms.

In the preparation of this REVIEW the following data, received up to July 20th, 1884, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and sixty-eight monthly journals, and one hundred and fifty-four monthly means from the former, and fifteen monthly means from the latter; two hundred and fifty-eight monthly registers from voluntary observers; forty-three monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Alabama, Illinois, Louisiana, Missouri, Ohio, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The mean atmospheric pressure for June, 1884, determined from the tri-daily telegraphic observations of the Signal Service, is exhibited by the isobarometric lines on chart ii. This chart shows the mean pressure for the month to have been greatest on the Atlantic coast, from Massachusetts to South Carolina, in the lower lake region and in the northeastern part of the upper lake region, where the barometric means exceeded 30.05, the highest, 30.10 and 30.11, being reported from Sandy Hook, New Jersey, and New London, Connecticut, respectively To the north and east of this area of barometric maxima, the mean pressure decreased to 29.95 at Father Point, Province of Quebec; westward to the one-hundredth meridian the pressure decreased gradually to 29.9, the isobars running almost directly north and south. The lowest barometric means for the month occurred between the one hundredth and the one-hundred and fifteenth meridians, south of the fortieth parallel of latitude; Forts Apache and Grant, Arizona, reporting the lowest means, 29.74 and 29.75, respectively. Over the region between the meridians above named, and north of latitude 40°, the barometric means vary from 29.81 to 29.9, while to the westward of the one-hundred and fifteenth meridian the means were higher, as is shown by the isobar of 29.95, which is traced from the northern boundary of Washington Territory to southern California, almost parallel to the Pacific coast.

Compared with the preceding month, the mean pressure has remained unchanged over narrow areas extending from Manitoba to the Texas coast, and from southern Missouri southeastward to northern Florida. A slight decrease occurred in southern Florida and in the lower Mississippi valley; from the one-hundredth meridian to the Pacific it was also less than for May, the deficiences exceeding .05 over nearly the whole of the area named and ranging from .07 to .11 over Idaho, Montana, Utah, and Wyoming. In the south Atlantic states, and from the upper Mississippi valley eastward the mean pressure has been greater than that for May, the increase being most marked in the lake region, New England, and the middle Atlantic states, where it varied from .10 to .18.

Compared with the normal pressure for June, deficiences varying from .01 to .07 are shown in the Gulf states, northern plateau, and north Pacific coast region. In all other districts the mean pressure has been above the normal; in California, the southern plateau, Tennessee and South Carolina, the increase varied from .01 to .05; in the middle and southern slopes, Missouri and Ohio valleys, Virginia and North Carolina, from .05 to .09; and from the upper Mississippi valley eastward to the New England coast, from .10 to .16.

BAROMETRIC RANGES.

The monthly barometric ranges were greatest in New England, the maximum, .90, occurring at Portland, Maine; they were least from Arizona eastward to the Mississippi river, and in southern Florida, the smallest, .25, being reported from Fort Grant, Arizona. To the north and east of a line extending from Dakota to the south Atlantic coast, the monthly

ranges exceeded .50, while to the south and west they were less, except over portions of Idaho, Oregon, and Washington Territory, where they were from .50 to .54.

In the several districts the monthly ranges varied as follows:

New England.—From .62 on the summit of Mount Washington, New Hampshire, to .90 at Portland, Maine.

Middle Atlantic states.—From .65 at Norfolk, Virginia, to .85 at Albany, New York.

South Atlantic states.—From .44 at Jacksonville, Florida, to .69 at Kitty Hawk, North Carolina.

Florida peninsula.—From .28 at Key West, to .40 at Cedar Keys.

East Gulf states.—From .33 at New Orleans, Louisiana, to .48 at Montgomery, Alabama.

West Gulf states.—From .30 at Galveston, Texas, to .35 at Fort Smith, Arkansas.

Rio Grande valley.—From .22 at Brownsville, Texas, to .28 at Rio Grande City, Texas.

Tennessee.—From .56 at Nashville, to .59 at Chattanooga.

Ohio valley.—From .61 at Louisville, Kentucky, to .75 at Pittsburg, Pennsylvania.

Lower lake region.—From .66 at Detroit, Michigan, to .79 at Rochester, New York.

Upper lake region.—From .52 at Duluth, Minnesota, to .83 at Mackinaw City, Michigan.

Extreme northwest.—From .41 at Fort Totten, Dakota, to .53 at Saint Vincent, Minnesota.

Upper Mississippi valley.—From .48 at Saint Louis, Missouri, to .59 at La Crosse, Wisconsin.

Missouri valley.—From .46 at Leavenworth, Kansas, to .58 at Fort Bennett, Dakota.

Northern slope.—From .40 at Fort Assinaboine, Montana, to .57 at Deadwood, Dakota.

Middle slope.—From .36 at Dodge City, Kansas, to .49 on the summit of Pike's Peak, Colorado.

Southern slope.—From .28 at Fort Davis, Texas, to .34 at Fort Stockton, Texas.

Southern plateau.—From .25 at Fort Grant, Arizona, to .38 at Fort Thomas, Arizona.

Middle plateau.—.41 at Salt Lake City, Utah.

Northern plateau.—From .46 at Dayton, Washington Territory, to .54 at Lewiston, Idaho, and Spokane Falls, Washington Territory.

North Pacific coast region.—From .41 at Fort Canby, Washington Territory, to .54 at Portland, Oregon.

Middle Pacific coast region.—From .37 at Sacramento, California, to .49 at Cape Mendocino, California.

South Pacific coast region.—From .32 at Los Angeles and San Diego, California, to .40 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

Six areas of high barometer were observed within the limits of the stations of observation, or to the east of the Atlantic coast districts during the month. Two high areas approached the stations from the north of Lake Superior and moved southeastward over New England, after which they extended over the middle and south Atlantic states; two appeared northeast of New England and passed eastward without causing any marked change in the weather conditions of the United States; and the remaining two apparently resulted from a gradual increase of pressure in the southeastern portion of the United States and probably formed a part of an extended high area from the Atlantic.

I.—On the 1st of the month this area extended over the Atlantic coast districts, the barometer being .5 above the normal for the month at the extreme northeastern stations, and from .2 to .4 above the normal in the lower lake region and thence southward to the eastern Gulf states. This high area disappeared to the eastward of Novia Scotia on the 3d, in advance of a slight depression which developed off the New England coast.

II.—This area was central in North Carolina on the morning of the 3d, while there was a slight increase of pressure in the northern portion of the lake region. The barometer rose slowly in the eastern portion of the United States until the morning of the 7th, the general distribution of pressure remaining unchanged. During the 8th, the barometer fell in the eastern districts and general rains prevailed from the Mississippi river to the Atlantic coast; the rains continued in the southern and middle Atlantic states until the 15th. This area remained nearly stationary until the 8th when it apparently disappeared to the east of Cape Hatteras, North Carolina.

III.—The pressure increased at stations northeast of New England on the 11th, indicating the advance of a high area to the south and west from the North Atlantic. This increase of pressure was attended by cool easterly winds and rain on the coast north of Cape Hatteras on the 12th, when this area moved rapidly to the east followed by a disturbance in the Saint Lawrence valley.

IV.—On the morning of the 12th, the reports from stations near Lake Superior indicated the approach of a cool wave, and by the morning of the 13th the barometer had risen to 30.4 and above at stations north of the lower lakes, and cool northerly winds prevailed throughout the northern states. During the 14th and 15th this high area extended southeastward over the Saint Lawrence valley and New England, attended by light frost as far south as New Jersey. After reaching the coast the direction of movement changed to southwest and during the 16th and 17th, it moved over the south Atlantic states, losing energy and finally disappeared by a gradual decrease of pressure on the 18th.

V.—This was an area of high barometer which appeared off the New England and Middle Atlantic coasts on the 22d, and disappeared to the east without causing a marked change in the temperature or pressure at the coast stations.

VI.—This is the second well-defined area of high barometer observed during the month. It first appeared in British America, north of Minnesota, on the 24th, and moved slowly eastward over the northern stations during the 25th, 26th, 27th and 28th; on the morning of the last named date it was central near Montreal. The barometer rose to 30.3 and above at stations in New England, the lake region, and the middle states, during the transit of this area over these districts. The course continued southeastward during the 29th and 30th, and it disappeared east of Cape Hatteras, the barometer being highest at this point on the night of the 30th, with southerly winds prevailing along the Atlantic coast.

AREAS OF LOW BAROMETER.

The following table gives the latitude and longitude in which each area was first and last observed, and the average hourly velocity of movement.

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I	45 00	94 00	42 00	91 00	12.5
II	37 00	110 00	32 00	87 00	12.0
III*	45 00	109 00	39 00	103 00	20.0
IV	42 00	107 00	46 00	101 00	18.5
V	42 00	115 00	57 00	107 00	26.5
VI	40 00	9 00	39 00	70 00	25.0
Mean hourly velocity					19.1

* United with number ii.

Six areas of low barometer, all of slight energy, have been traced on the tri-daily weather charts during the month of June, while the reports indicate the easterly movement of low areas of greater energy to the north of the United States. One depression reached the Atlantic coast; numbers ii., iii., iv., and v., apparently developed in the plateau regions and disappeared in the central valleys. As is usual during the summer months, the low areas were retarded in the mountain dis-

tricts, and generally they were limited both in number and intensity.

I.—A slight depression was central in Minnesota on the last of May. On the morning of the 1st of June this depression had moved eastward to central Wisconsin, and light showers prevailed in the upper lake region and Mississippi valley. The high area to the north of Minnesota apparently forced this disturbance to the southward during the 1st, and although well-defined as central in eastern Iowa at the morning report of the 2d, it lost energy when the area of rain extended southward over the Gulf states.

II.—This depression extended over the Rocky mountain regions on the morning of the 4th, when a barometric trough extended from British America to northern Mexico. Within this extended depression two minor depressions were observed, one central in southern Utah and the other in northern Montana. The depression traced as number ii., continued almost stationary over the southern plateau region from the 4th until the 7th, when it passed to the eastern slope of the Rocky mountains. An area of high barometer appeared to the north of the upper Missouri valley on the 8th, and the cool northerly winds from that region apparently increased this depression over the lower Missouri valley, and thence eastward during the 8th and 9th. On the morning of the 8th the barometer was low from the lower Saint Lawrence valley southwestward to Arizona, and high on the Atlantic and Gulf coasts, and in British America north of Dakota. The flow of cool air from north of the lake region resulted in general rains and strong northerly winds north of the Ohio valley and in the northwest on the 9th, as this disturbance passed eastward over the states north of the Ohio river. The barometer fell to 29.6 at Indianapolis, Indiana, at midnight of the 9th, when the centre of disturbance was near that station, and heavy rains were reported from the southern states northward to the lake region. This depression continued its easterly course until 3 p. m. of the 10th, when it moved directly south, attended by continued rains in the southern states. The barometer rose at the centre of this depression as it moved southward, and it finally disappeared by a gradual increase of pressure. The rains attending this depression continued in the southern states east of the Mississippi river until the 13th.

III.—This area formed a part of the barometric trough which extended over the Rocky mountains on the 4th, 5th, and 6th, the chief depression being central over the southern plateau region. After passing eastward to the central Missouri valley during the 5th and 6th, it apparently united with the disturbance traced as number ii., which was central in eastern Colorado at 3 p. m. of the 7th.

IV.—The morning reports of the 11th indicated that a low area was slowly forming in the Rocky mountain regions—local rains and northerly winds being reported from the northern stations, and the barometer reading below 29.7 in Colorado. The 3 p. m. report of the 11th exhibited a well-marked depression in eastern Colorado, with indications of the advance of a cool wave from north of the lake region. This disturbance moved northward from Colorado on the 11th, and finally disappeared in central Dakota on the 12th.

V.—This low area was central in northern Nevada at 11 p. m. of the 13th. The area of high barometer which extended over the regions north of Lake Superior apparently caused this depression to move northeastward over Montana, and it disappeared to the north of the Rocky mountain stations on the 14th, the barometer remaining low in the southern districts of the Rocky mountains during the greater portion of the month.

VI.—This disturbance developed in the upper Mississippi valley on the 25th, and passed directly eastward over the Ohio valley and the middle Atlantic states during the 25th and 26th. It increased in energy as it approached the coast, and the sudden and heavy rains caused much damage by floods in the middle Atlantic states and southern New England. Destructive gales also occurred on the 26th and 27th at coast stations between Cape Hatteras and New York. This disturbance passed directly eastward from the coast and was apparently prevented from following the usual northeasterly course, by the high area which extended over the region immediately to the north.

NORTH ATLANTIC STORMS DURING JUNE, 1884.

[*Pressure expressed in inches and in millimetres; wind-force by scale of* 0—10.

The paths of the atmospheric depressions that have appeared in the north Atlantic ocean during the month are approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to July 22, 1884.

The observations used are in general simultaneous, being taken each day at 7h. a. m. Washington, or 12h. 8m. p. m. Greenwich, mean time.

Only four depressions are charted for June, 1884; none of these exhibited any decided storm energy nor can they be identified with any of the depressions which appeared in the United States. Several slight and unimportant disturbances (not charted) appear to have moved from northern Canada over the Gulf of Saint Lawrence to the Atlantic, where they dissipated. The weather over the north Atlantic during the month may be summarized as follows: 1st to 14th, general cloudy weather, light variable airs to moderate westerly and northerly breezes; 15th to 22d, weather changeable, light to moderate breezes, variable in direction; 22d to 30th, moderate to strong southwest to northwest winds, increasing occasionally to moderate gales; weather overcast and rainy. (The heavy northeasterly gales which prevailed on the Atlantic coast, between Cape Hatteras and Sandy Hook during the 26th, 27th, and 28th, occurred in connection with low area vi. and high area vi., and are referred to under the respective headings.) Frequent and dense fogs prevailed over the region west of the fortieth meridian from the 1st to 25th.

The following descriptions refer to the depressions charted:

1.—This disturbance was first noticed by the s. s. "Strassburg," H. Heineke, commanding. On the 2d, that vessel, in N. 39° 7′, W. 65° 16′, had barometer 29.84 (757.9), a fall of about .4 inch during the previous twenty-four hours; on the 1st the wind was n. and nw., force 7 to 8, changing on the 2d to ssw. and sw., force 7 to 8. On the same date the s. s. "Noordland," in N. 40° 8′, W. 63° 28′, had a fresh ne. to se. gale, with rainy weather. By the 3d the disturbance had moved northward and was central south of Nova Scotia, the lowest reported pressure being about 29.85 (758.2). During the day it apparently moved northward or northwestward over the maritime provinces and disappeared in the Gulf of Saint Lawrence on the 4th.

2.—This disturbance appeared near N. 47°, W. 39°, on the 8th; on that date the s. s. "Wieland," C. Hebich, commanding, reported in N. 46° 47′, W. 38° 10′, barometer 29.75 (755.6), wind ssw., force 4. Vessels to the westward of W. 40°, had moderate westerly and northwesterly winds, while those to the eastward, between W. 40° and 30°, had moderate southerly winds. By the 9th the depression had moved north-northeastward to about N. 55°, W. 29°; the s. s. "Lake Huron," W. Bernson, commanding, in N. 53° 40′, W. 29° 54′, reported barometer 29.53 (750.0), wind wnw., force 7; heavy sea and cloudy. Over the region south of the fiftieth parallel the pressure was 30.0 (762.0) and above; during the 9th, another depression, (not charted), appears to have moved eastward north of the fiftieth parallel, as indicated by the following report: barkentine "Corisande," D. Thoms, commanding; "at 10 p. m., Greenwich time, on the 9th, in N. 52° 25′, W. 42° 50′, the wind, which was ssw., increased to a moderate gale and veered to w., barometer reading 29.5 (749.3). On the 10th, in N. 53° 25′, W. 39° 17′, the barometer read 29.58 (751.3), wind w., force 6, heavy sea and cloudy weather." During the day, both depressions disappeared beyond the limits of observation.

3.—This disturbance appeared in the Gulf of Saint Law-

rence on the 15th; it probably moved eastward over Newfoundland, and on the 16th, the centre was to the westward of the fiftieth meridian, the lowest reported barometer reading being 29.8 (756.9), wind ssw., force 6, hazy. The depression moved northeastward and on the 17th, was probably near N. 55°, W. 35°; the s. s. "Brooklyn," G. S. Dale, commanding, reported in N. 52° 3′, W. 35° 45′, barometer 29.73 (755.1), wind wsw., force 4, raining; s. s. "Grecian," C. E. LeGallais, commanding, in N. 51° 35′, W. 39° 37′, barometer 29.84 (757.9), wind n., force 2, cloudy. The depression either filled in or passed northward beyond the range of observations; its eastward movement was apparently retarded by an area of high pressure which occupied the ocean north of N. 50° and east of W. 30°, from the 14th to the 18th.

4.—This disturbance appeared in mid-ocean on the last day of the month. Its presence is indicated by the following reports: S. S. "Toronto," J. McAuley, commanding, in N. 56° 15′, W. 29° 1′, barometer, 29.51 (749.5), wind s., force 6, hazy; s. s. "Lake Manitoba," Wm. Steward, commanding, in N. 53° 40′, W. 29° 50′, barometer 29.55 (750.6), wind ssw., force 6, overcast; s. s. "Celtic," B. Gleadell, commanding, in N. 49° 15′, W. 30° 51′, barometer 29.64 (752.8), wind s. by w., force 6, overcast and rainy; s. s. "Nessmore," J. Inch, commanding, in N. 46° 52′, W. 32° 30′, barometer 29.63 (752.6), wind ssw., force 6, cloudy; s. s. "Werra," J. Barre, commanding, in N. 46° 39′, W. 35° 15′, barometer 29.66 (753.4), wind wnw., force 6, squally. These reports show a decrease of pressure averaging .35 inch during the twenty-four hours preceding the observation of the 30th.

OCEAN ICE.

Chart i. also exhibits the southern and eastern limits of the region within which icebergs were observed in the north Atlantic ocean from June 1st to July 3d, 1884. These limits are determined from reports sent by shipmasters to this Office; reports furnished through the co-operation of the "New York Herald Weather Service," and from other data published in the "New York Maritime Register."

The extreme southern limit of the ice-region was near N. 40° 40′, W. 48°, and extended thence westward along the forty-first parallel to about W. 54°. The easternmost limit of the ice-region was near W. 45° 30′.

Compared with the chart for the preceding month (May), there is a slight difference in the positions of the limits, the southern limit in June being about 30′ south of that for May, while the eastern limit is about one degree to the westward of the May limit.

A comparison with the chart for the corresponding month in 1883, shows no difference in the southern limit of the ice-region, but the eastern limit is about 3° 30′ to the westward of that for last year.

A comparison with the chart for the same month in 1882, shows that the area of the ice-region in June, 1884, is much less than for the same month in 1882. In the latter year, icebergs were reported as far south as N. 39° 30′, or about a degree south of the limit in 1884; the eastern limit of the ice-region reached W. 39°, or about 6° 30′ farther to the east than during the present month.

The following reports have been received up to July 21, 1884. Captain H. McKay, commanding the s. s. "Bothnia," reported: "May 30th, between N. 43° 04′, W. 47° 55′, and N. 42° 16′, W. 49° 37′, passed several icebergs. In N. 42° 47′, W. 48° 26′, passed within half a mile of a large iceberg, and found no difference in the temperature of the air and water, which was: air 52°, water 52°. On the 31st, in N. 41° 56′, W. 51° 12′, passed a piece of ice, very dangerous to shipping."

June 1st.—S. S. "Republic," in N. 41° 53′, W. 51° 35′, passed an iceberg; also one in N. 41° 47′, W. 51° 14′; s. s. "Scandinavian," in N. 42° 54′, W. 49° 8′, passed two icebergs.

2d.—S. S. "State of Georgia," between N. 42° 30′, W. 49° 20′ and N. 42° 36′, W. 48° 17′, passed three icebergs; two of them very large.

3d.—S. S. "Arizona," between N. 42° 20′, W. 49° 46′ and N. 42° 48′, W. 48° 35′, passed several icebergs.

5th.—Captain D. Thoms, commanding the barkentine "Corisande," reported having encountered much ice outside the harbor of Saint John's, Newfoundland.

7th.—Bark "Silica," in N. 60° 15′, W. 50° 22′, reported several icebergs in sight; s. s. "Amerique," in N. 41° 10′, W. 53° 1′, passed an iceberg.

8th.—S. S. "British Prince," in N. 41° 12′ W. 50° 36′, passed three icebergs; the largest being about one hundred feet high and five hundred feet long; s. s. "Aurania," in N. 42° 4′, W. 48° 5′, passed two icebergs and several pieces of drift ice; s. s. "Saint Laurent," in N. 42° 36′, W. 49° 22′, passed a small iceberg; also in N. 42° 38′, W. 48° 37′, passed another; also in N. 42° 40′, W. 48° 26′, passed a large iceberg, with another berg in sight to the southward; s. s. "Lake Manitoba," passed several icebergs from 90 to 150 miles ene. of Cape Race.

9th.—S. S. "Polynesia," in N. 42° 12′, W. 48° 16′, passed two icebergs; s. s. "Gellert," in N. 41° 55′, W. 48° 34′, passed a large iceberg, apparently about 1,500 feet long and one hundred and fifty feet high.

11th.—S. S. "City of Berlin," in N. 42° 17′, W. 48° 35′, passed two icebergs; temperature of the air, 57°; water, 54°; s. s. "Circassian," in N. 47° 40′, W. 49° 50′, passed an iceberg and several small pieces.

12th.—S.S. "Lake Huron," in N. 48° 19′, W. 50° 20′, passed an iceberg; s. s. "Oregon," between N. 44° W. 45° 23′ and N. 44° 3′, W. 49° 30′, passed three icebergs.

13th.—Ship "Derby," in N. 42° 42′, W. 48° 20′, passed a large iceberg; bark "J. Walter Scammell," in N. 45° 13′, W. 48° 34′, passed an iceberg.

14th.—S. S. "Phœnician," in N. 42° 34′, W. 50° 58′ passed a small iceberg.

15th.—S. S. "Oder," in N. 46° 20′, W. 48° 28′, passed a large iceberg; s. s. "State of Pennsylvania," in 41° 38′ and from W. 48° to W. 49°, passed six icebergs; s. s. "Ludgate Hill," in N. 42° 40′, W. 51° 3′, passed an iceberg; ship "Alfred D. Snow," in N. 44° 45′, W. 48° 00′, passed an iceberg; s. s. "Canada," in 42° 25′, W. 48° 15′, passed an iceberg; s. s. "Lydian Monarch," in N. 47° 10′, W. 49° 27′, passed several icebergs and small pieces; s. s. "Grecian" in N. 47° 10′, W. 51° 15′ passed four icebergs; also in 47° 25′, W. 50°, passed two icebergs.

16th.—S. S. "Leerdam," in N. 45° 22′, W. 52° 50′, passed an iceberg about one hundred and fifty feet high and of great length.

17th.—S. S. "Germanic," in N. 42° 19′, W. 48° 36′, passed an iceberg about sixty feet high, also passed a dozen small pieces of ice in a group.

18th.—S. S. "Lord Gough," in N. 43° 28′, W. 48° 4′, passed one large and one small iceberg; s. s "Britannic," in N. 43° 50′, W. 48° 42′, passed several icebergs; s. s. "Lemuria," in N. 43°, W. 48°, passed an iceberg; ship "Shakespere," in N. 52° 30′, W. 45° 55′, passed an iceberg.

19th.—Bark "Homborgsund," in N. 41°, W. 47°, passed fifteen or twenty icebergs, some fifty feet high; ship "Shakespere," in N. 46° 30′, W. 48°, passed an iceberg about two hundred feet high; bark "Chignecto," in N. 46° 22′, W. 49° 5′ passed an iceberg.

20th.—S. S. "Britannia," in N. 40° 42′, W. 47° 49′, passed two icebergs about one hundred feet high; bark "Chignecto," in N. 46° 20′, W. 50° 10′, passed an iceberg; s. s. "Arizona," in N. 45° 54′, W. 47° 50′, saw two large icebergs twenty miles to the southward; s. s. "Brooklyn," in N. 47° 00′, W. 50° 40′, passed two large icebergs; from there to Cape Race saw several bergs; one, very long and low, bore ene., twenty miles from Cape Race; s. s. "Gallia," in 43° 14′, W. 47° 58′, passed an iceberg.

22d.—S. S. "Rhynland," in N. 40° 48′, W. 47° 50′, passed two icebergs, one very large; also, in N. 40° 45′, W. 48° 40′, passed several icebergs.

24th.—S. S. "Egypt," in N. 45° 48′, W. 45° 30′, passed an

iceberg; bark "Gloire," in N. 43° 20′, W. 48° 00′, passed an iceberg.

25th.—S. S. "Elbe," in N. 43° 22′, W. 47° 42′, passed a large iceberg.

27th.—S. S. "Circassia," between N. 46° 49′, W. 48° 37′ and N. 46° 12′, W. 50° 00′, passed several icebergs and detached pieces of ice; s. s. "Acoriano," in N. 44° 52′, W. 45° 35′ passed an iceberg apparently two hundred feet high and two miles long.

29th.—S. S. "Donau," in N. 42° 16′, W. 48° 20′, passed a large iceberg; ship "E. J. Spicer," off Cape Race, saw five icebergs.

30th.—"Assyrian Monarch," in N. 43° 50′, W. 48° 10′, passed an iceberg.

July 3d.—S. S. "Circassian," in N. 54° 15′, W. 48° 27′, passed a large iceberg; from there to Belle Isle, passed about sixty bergs; at 10 p. m., passed Belle Isle, and from there to Point Amour, passed about twenty large bergs, extending across the strait.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada for June, 1884, is exhibited on chart ii. by the dotted isothermal lines.

In the following table are shown the normal temperatures for June, the mean temperatures for June, 1884, and the departures from the normal for each of the several geographical districts, as deduced from the records of the Signal Service:

Average temperatures for June, 1884.

Districts.	Average for June. Signal-Service observations.		Comparison of June, 1884, with the average for several years.
	For several years.	For 1884.	
	°	°	°
New England	63.6	64.8	1.2 above.
Middle Atlantic states	70.6	69.9	0.7 below.
South Atlantic states	77.3	73.5	3.8 below.
Florida peninsula	81.9	78.9	3.0 below.
Eastern Gulf states	79.3	75.6	3.7 below.
Western Gulf states	80.2	78.3	1.9 below.
Rio Grande valley	84.6	82.1	2.5 below.
Tennessee	76.2	72.4	3.8 below.
Ohio valley	73.3	73.5	0.2 above.
Lower lake region	65.5	67.3	1.8 above.
Upper lake region	61.5	62.8	1.3 above.
Extreme northwest	62.0	66.4	4.4 above.
Upper Mississippi valley	71.0	70.9	0.1 below.
Missouri valley	70.6	72.0	1.4 above.
Northern slope	62.3	64.8	2.5 above.
Middle slope	70.5	70.1	0.4 below.
Southern slope	78.5	75.7	2.8 below.
Southern plateau	77.7	73.9	3.8 below.
Northern plateau	64.8	66.2	1.4 above.
North Pacific coast region	60.8	60.7	0.1 below.
Middle Pacific coast region	68.7	64.8	3.9 below.
South Pacific coast region	71.9	70.6	1.3 below.
Mount Washington, N. H	43.7	49.0	5.3 above.
Pike's Peak, Colo	33.0	30.4	2.6 below.
Salt Lake City, Utah	68.3	68.7	0.4 above.

Over the northern portions of the United States the mean temperatures were higher than the average for June, and over the southern portions of the country, they were lower. A comparison of the monthly mean temperatures reported from the various stations, with their respective normals for June, shows two areas of maximum departures below the normal—one comprising Tennessee, the south Atlantic and east Gulf states, and the other including California (except along the coast where a normal condition prevailed) and Arizona. In the first-named district the most marked deficiencies occurred at the following stations: Charlotte, South Carolina, 6°.2; Atlanta, Georgia, 5°.5; Memphis, Tennessee, 5°.2; Augusta, Georgia, 5°; and Savannah, Georgia, 4°.8. In western Arizona and eastern California the deficiencies varied from 4°.1, at Yuma, Arizona, and Sacramento, California, to 4°.9, at Prescott, Arizona, and 7°.9 at Red Bluff, California. Over a narrow area extending from the Gulf coast northward to the Missouri river the deficiencies varied from 1° to 2°. In the northern part of the country but one area of maximum departure above the normal temperature is shown, viz.: the northern portions of Dakota and Minnesota, where the mean temperatures ranged from 4°.6 above the normal at Saint Vincent, Minnesota, to 6°.2 and 6°.6 above at Bismarck and Fort Buford, Dakota, respectively; in the upper Mississippi valley and north Pacific coast region, the means were about normal; and over the other northern districts they were from 1° to 4° above.

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations:

Stations reporting highest.		Stations reporting lowest.	
	°		°
Rio Grande City, Texas	84.5	Pike's Peak, Colorado	30.4
Maricopa, Arizona	82.5	Mount Washington, New Hampshire	49.0
Key West, Florida	81.7	Fort Stanton, New Mexico	53.0
Yuma, Arizona	81.7	Cape Mendocino, California	54.6
Galveston, Texas	81.5	Fort Canby, Washington Territory	55.2
Fort McDowell, Arizona	80.2	Eastport, Maine	57.4
Indianola, Texas	80.2	Duluth, Minnesota	57.7
Brownsville, Texas	79.8	Fort Klamath, Oregon	58.3
Shreveport, Louisiana	79.4	Olympia, Washington Territory	58.5
El Paso, Texas	78.3	San Francisco, California	59.0
Cedar Keys, Florida	78.2	Marquette, Michigan	59.7
Fort Concho, Texas	77.4	Milwaukee, Wisconsin	60.3
Sanford, Florida	76.8	Mackinaw City, Michigan	60.9

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures for June, 1884. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: mean temperature, 76°.4, is 0°.2 above the June average of the two preceding years.

Dakota.—Webster, Day county: mean temperature, 76°.6, is 6°.8 above the June average of the two preceding years.

Illinois.—Swanwick, Perry county: mean temperature, 71°.8, is 1°.4 below the June average of the last three years.

Anna, Union county: mean temperature, 73°.7, is 2°.2 below the June average of the last nine years.

Riley, McHenry county: mean temperature, 66°.1, corresponds with the June normal for a period of twenty-three years.

Mattoon, Coles county: mean temperature, 72°.0, is 0°.6 below the June average of the last four years.

Collinsville, Madison county: mean temperature, 72.°3, is 2°.7 below the June normal.

Morrison, Whiteside county: mean temperature, 68°.0, is 1°.2 below the average of the last nine years.

Indiana.—Wabash, Wabash county: mean temperature, 71°.1, is 1°.2 above the June average of the last eight years.

Logansport, Cass county: mean temperature, 71°.6, is 2°.8 below the June average for a period of twenty-five years.

Kansas.—Independence, Montgomery county: mean temperature, 73°.1, is 2° below the June average of the last thirteen years.

Lawrence, Douglas county: mean temperature, 71°.1, is 2°.9 below the June average of seventeen years.

Wellington, Sumner county: mean temperature, 71°.4, is 2°.8 below the June average of the last six years.

Maine.—Gardiner, Kennebec county: mean temperature, 64°.1, is 0°.8 above the June average of the last forty-eight years.

Maryland.—Fallston, Harford county: mean temperature, 68°.5, is 2°.3 below the June average of a period of thirteen years.

New York.—Palermo, Oswego county: mean temperature, 65°.1, is 1°.4 above the June average of the last thirty-one years.

North Volney, Oswego county: mean temperature, 67°.4, is 2°.3 above the June average of the last sixteen years.

Dannemora, Clinton county: mean temperature, 69°.4, is the highest June mean of the last five years.

Table of maximum and minimum temperatures for June, 1884.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Mobile	96	62	Marion	101	55
Do	Montgomery	94	60	Birmingham	96	46
Arizona	Phœnix	114	48	Maricopa	115	72
Do	Willcox	108	34	Casa Grande	113	68
Arkansas	Fort Smith	100	54	Madison	103	56
Do	Little Rock	95	62	Fayetteville	90	46
California	Los Angeles	98	50	Willows	107	43
Do	Fort Bidwell	91	36	Summit	60	32
Colorado	West Las Animas	98	48	Fort Lyon	98	47
Do	Pike's Peak	44	19	Fort Lewis	84	35
Connecticut	New Haven	92	41	Hartfort	97	49
Do	New London	88	43	Voluntown	94	54
Dakota	Fort Buford	99	44	Webster	102	54
Do	Fort Yates	96	40	Fort Buford	100	34
Delaware	Del. Breakwater	84	52			
District of Columbia	Washington City	96	50	Rock Creek bridge	96	60
Florida	Sanford	95	63	Waldo	106	58
Do	Jacksonville	92	62	Live Oak	95	52
Georgia	Augusta	93	58	Athens	103	49
Do	Atlanta	89	57	Allapaha	92	41
Idaho	Lewiston	96	49	Fort Lapwai	96	44
Do	Cœur d'Alene	89	40			
Illinois	Cairo	92	56	Greenville	97	58
Do	Chicago	86	47	Monmouth	94	45
Indiana	Indianapolis	93	55	Laconia	95	61
Do				Clinton	94	50
Indian Territory	Cantonment	93	56			
Iowa	Des Moines	95	47	Logan	94	44
Do	Dubuque	90	47	Humboldt	86	36
Kansas	Dodge City	92	52	Manhattan	101	54
Do	Leavenworth	91	52	Westmoreland	95	46
Kentucky	Louisville	95	58	Frankfort	92	52
Do				Richmond	88	59
Louisiana	Shreveport	99	63	Minden	102	58
Do	New Orleans	91	68	Alexandria	99	53
Maine	Portland	89	44	Cornish	92	46
Do	Eastport	82	39	Gardiner	84	37
Maryland	Baltimore	93	52	Sandy Springs	97	46
Do	Ocean City	84		Woodstock	91	41
Massachusetts	Boston	93	42	Westborough	100	35
Do	Thatcher's Island	88	42	Taunton	95	34
Michigan	Marquette	91	37	Mendon	97	46
Do	Detroit	90	48	Fort Brady	91	36
Minnesota	Moorhead	91	39	Hastings	99	45
Do	Saint Vincent	90	39	Fort Snelling	99	35
Mississippi	Vicksburg	97	62	Meridian	100	54
Do				Aberdeen	95	40
Missouri	Saint Louis	95	52	Glasgow	100	52
Do				Lexington	88	48
Montana	Fort Benton	100	44	Fort Assinaboine	101	44
Do	Fort Maginnis	88	42	Fort Ellis	93	30
Nebraska	North Platte	94	49	Red Willow	104	47
Do	Omaha	91	52	Crete	91	45
Nevada				Brown's	96	54
Do				Hot Springs	95	32
New Hampshire	Mount Washington	67	26			
New Jersey	Sandy Hook	91	51	Readington	100	52
Do	Little Egg Harbor	86	46	Salem City	98	42
New Mexico	Fort Craig	104	49	Fort Union	88	33
Do				Deming	98	01
New York	Albany	92	51	Mountainville	97	37
Do	Rochester	86	47	Madison Barracks	90	40
North Carolina	Kitty Hawk	91	52	Chapel Hill	98	41
Do	New River Inlet	88	46	Lumberton	96	47
Ohio	Cincinnati	93	59	Jacksonborough	101	54
Do	Cleveland	84	51	Sidney	96	40
Oregon	Ashland	91	60	Klamath Agency	93	37
Do	Fort Klamath	86	26	Fort Klamath	85	31
Pennsylvania	Philadelphia	93	47	Tamaqua	100	36
Do	Pittsburg	95	50	Troy	92	35
Rhode Island	Narragansett Pier	91	41	Providence	95	40
Do	Block Island	83	46			
South Carolina	Charleston	89	58	Cheraw	100	49
Do				Allendale	93	43
Tennessee	Memphis	96	59	Dyersburg	99	56
Do	Knoxville	92	53	Andersonville	91	47
Texas	El Paso	112	57	Dallas	100	59
Do	Fort Elliott	93	53	Weatherford	95	50
Utah	Salt Lake City	92	48	Promontory	100	45
Do	Fort Thornburg	89	42	Nephi	91	40
Vermont				Woodstock	96	36
Do				Newport	92	44
Virginia	Fort Myer	92	47	Accotink	96	54
Do	Lynchburg	92	50	Wytheville	85	43
Washington Territory	Dayton	96	38	Pleasant Grove	89	36
Do	Spokane Falls	94	43	Fort Spokane	95	37
West Virginia				Helvetia	96	40
Wisconsin	La Crosse	88	51	Evansville	94	54
Do	Milwaukee	84	44	Neillsville	89	36
Wyoming	Cheyenne	93	43	Fort Fred Steele	93	36
Do				Fort Bridger	84	30

New Jersey.—South Orange, Essex county: mean temperature, 68°.1, is 1°.8 below the June average of the last fourteen years.

Ohio—Wauseon, Fulton county: mean temperature, 69°.4, is 1°.1 above the June average of the last fourteen years.

Pennsylvania.—Dyberry, Wayne county: mean temperature, 66°.8, is 2° above the June average of the last eighteen years.

Texas.—New Ulm, Austin county: mean temperature, 79°.0, is 1°.5 below the June average of the last twelve years.

Vermont.—Woodstock, Windsor county: mean temperature, 66°.2, is 2°.9 above the June average of the last seventeen years.

Virginia.—Variety Mills, Nelson county: mean temperature, 69°.3, is 2°.2 below the average of the last seven years.

Wytheville, Wythe county: mean temperature, 65°.9, is 2°.2 below the June normal of twenty-one years.

West Virginia.—Helvetia, Randolph county: mean temperature, 67°.5, is 1°.4, above the June average of the last eight years.

MONTHLY RANGES OF TEMPERATURE.

The monthly ranges of temperature were greatest in Oregon and Washington Territory (except along the coast), in the northern portions of Idaho and Montana, in Dakota, western Minnesota, Arizona, Colorado and New Mexico; they were least along the Pacific and Gulf coasts. The extreme monthly ranges varied from 18° at Cape Mendocino and San Francisco, California, and 19° at Key West, Florida, to 66° and 74° at Phœnix and Willcox, Arizona, respectively.

Monthly ranges of 55° or more occurred as follows: 55° at Yuma, Arizona, Fort Bidwell, California, Fort Craig, New Mexico, and Fort Buford, Dakota; 56° at Fort Yates, Dakota, Fort Benton, Montana, and Prescott, Arizona; 57° at Fort Apache, Arizona; 58° at Fort Thomas and Maricopa, Arizona; 60° at Dayton, Washington Territory and Fort Klamath, Oregon; 61° at San Carlos, Arizona; 63° at Fort McDowell, Arizona; 65° at Wickenburg, Arizona; 66° at Phœnix, Arizona, and 74° at Willcox, Arizona.

The following are the smallest monthly ranges reported: 18° at Cape Mendocino and San Francisco, California; 19° at Key West, Florida; 20° at Fort Canby, Washington Territory; 22° at New Orleans, Louisiana; 24° on the summit of Pike's Peak, Colorado; 27° at Brownsville, Texas, Hatteras, North Carolina, and Neah Bay, Washington Territory; 28° at Fort Macon, North Carolina, and Pensacola, Florida; 29° at Cedar Keys, Florida; 30° at Jacksonville, Florida; 31° at Charleston, South Carolina, and San Diego, California; 32° at Pysht, Washington Territory, Atlanta, Georgia, and Delaware Breakwater, Delaware.

GREATEST DAILY RANGES OF TEMPERATURE.

The greatest daily ranges of temperature varied in the several districts as follows:

New England.—From 22° at Block Island, Rhode Island, on the 7th, to 38° at New Haven, Connecticut, on the 16th.

Middle Atlantic states.—From 25° at Delaware Breakwater, Delaware, and Cape May, New Jersey, on the 3d and 16th, respectively, to 33° at New York City, on the 16th.

South Atlantic states.—From 17° at Charleston, South Carolina, on the 9th, to 27° at Wilmington, North Carolina, on the 3d.

Florida peninsula.—From 19° at Key West, on the 28th, to 26° at Sanford, on the 8th.

East Gulf states.—From 16° at New Orleans, Louisiana, on the 24th, to 26° at Mobile, Alabama, on the 19th.

West Gulf states.—From 17° at Indianola, Texas, on the 14th, to 37° at Fort Smith, Arkansas, on the 12th.

Rio Grande valley.—From 22° at Brownsville, Texas, on the 5th, to 31° to Rio Grande City, on the 21st.

Tennessee.—From 26° at Nashville, on the 1st, to 28° at Knoxville, on the same date.

Ohio valley.—From 22° at Cincinnati, Ohio, on the 1st, to 33° at Pittsburg, Pennsylvania, on the 18th and 19th.

Lower lake region.—From 25° at Erie, Pennsylvania, on the 17th, to 33° at Rochester, New York, on the 9th.

Upper lake region.—From 24° at Chicago, Illinois, on the 9th, to 45° at Marquette, Michigan, on the 11th.

Extreme northwest.—From 34° at Fort Totten, Dakota, on the 10th, to 42° at Fort Buford, Dakota, on the 18th.

Upper Mississippi valley.—From 21° at Cairo, Illinois, on the 1st, to 31° at Dubuque, Iowa, on the 11th.

Missouri valley.—From 28° at Yankton, Dakota, on the 13th, to 40° at Fort Bennett, Dakota, on the 13th.

Northern slope.—From 30° at Deadwood, Dakota, and Helena, Montana, on the 13th and 18th, respectively, to 48° at Fort Benton, Montana, on the 2d.

Middle slope.—From 17° on the summit of Pike's Peak, Colorado, on the 1st, and 27° at Fort Elliott, Texas, on the 29th, to 38° at Denver, Colorado, on the 13th.

Southern slope.—From 33° at Fort Concho, Texas, on the 14th, to 38° at Fort Davis, Texas, on the 8th.

Southern plateau.—From 28° at Fort Grant, Arizona, on the 15th, to 55° at Fort Apache, Arizona, on the 24th.

Middle plateau.—30° at Salt Lake City, Utah, on the 22d.

Northern plateau.—From 32° at Boisé City, Idaho, on the 25th, to 43° at Dayton, Washington Territory, on the 21st.

North Pacific coast region.—From 15° at Fort Canby, Wash-

Table of comparative maximum temperatures for the month of June.

State or Territory.	Maximum for June, 1884, Signal Service.		Maximum since Signal-Service stations were opened—3 to 13 years.			Highest from any other source.			
	Station.	Temperature.	Station.	Temperature.	Year.	Place.	Temperature.	Year.	Length of record.
		°		°			°		Years.
Alabama	Montgomery	94	Montgomery	106	1881	Mount Vernon Arsenal	102	1876	35
Do	Mobile	96	Mobile	100	1877, 1882	Mobile	96		34
Arizona	Maricopa	113	Maricopa Wells	116	1876	Fort Mojave	119	1876	13
Do	Yuma	113	Yuma	117	1883	Fort Lowell	116	1876	12
Arkansas	Fort Smith	100	Fort Smith	101	1882	Fort Smith	99		21
Do	Little Rock	95	Little Rock	98	1882	Little Rock	95		28
California	Los Angeles	98	Visalia	109	1879	Fort Miller	121	1853	13
Do	Red Bluff	94	Red Bluff	105	1878	Fort Yuma	117	1859	31
Colorado	Denver	90	Denver	99	1873	Fort Lyon	107		22
Do	Pike's Peak	44	Pike's Peak	63	1881	Fort Garland	93		24
Connecticut	New London	88	New Haven	92	1880	New Haven	102	1864	87
Do	New Haven	92	New London	89	1880	Columbia	96		10
Dakota	Fort Buford	99	Fort Sully	111	1874, 1876	Fort Sully	108		16
Do	Fort Bennett	97	Fort Meade	103	1881	Fort Buford	106	1868, 1870	15
Delaware	Delaware Breakwater	84	Delaware Breakwater	89	1880	Fort Delaware	97		45
District of Columbia	Washington City	96	Washington City	102.5	1874	Washington City	99		49
Florida	Jacksonville	92	Jacksonville	100	1880	Fort King	106	1833	10
Do	Sanford	95	Saint Mark's	98	1876, 1877	Fort Barrancas	104	1854	57
Georgia	Augusta	93	Augusta	102	1881	Forsyth	104	1881	7
Do	Savannah	91	Savannah	100	1880	Oglethorpe Barracks	102	1845	40
Idaho	Boisé City	95	Boisé City	96	1878	Fort Boisé	107	1870	15
Do	Fort Lapwai	90	Fort Lapwai	97	1881	Fort Lapwai	105		16
Illinois	Chicago	86	Chicago	98	1872	Chicago	102		38
Do	Cairo	92	Cairo	95	1874, 1881	Rock Island Arsenal	102	'70? '73?	12
Indiana	Indianapolis	93	Indianapolis	96	1874	Vevay	100	'65? '66?	14
Do						Spiceland	97		7
Indian Territory	Cantonment	93	Fort Sill	105	1881	Fort Gibson	103		48
Do			Fort Gibson	100	1879, 1881	Fort Sill	103		9
Iowa	Dubuque	90	Dubuque	98	1874	Guttenberg	103	1870	12
Do	Des Moines	93	Keokuk	96	1873	Dubuque	102	1870	11
Kansas	Dodge City	92	Dodge City	102	1880	Fort Wallace	108	1879	7
Do	Leavenworth	91	Leavenworth	99	1875	Fort Hays	106		10
Kentucky	Louisville	95	Louisville	100	1874	Newport Barracks	96		28
Louisiana	Shreveport	99	Shreveport	104	1875	Point Pleasant	101	1881	6
Do	New Orleans	91	New Orleans	97	1881	Baton Rouge	98		57
Maine	Portland	89	Portland	94	1878	Brunswick	98		53
Do	Eastport	82	Eastport	81	1878	Hancock Barracks	98		17
Maryland	Baltimore	93	Baltimore	97.5	1874	Fort Washington	105	1853	38
Do	Ocean City	84				Fort McHenry	100	'34, '49, '72	44
Massachusetts	Boston	93	Boston	98	1874	Fort Independence	99	1854, 1872	47
Do	Thatcher's Island	88	Springfield	94	1880	Lunenburg	97		24
Michigan	Alpena	85	Alpena	97	1874	Marquette	101		8
Do	Marquette	91	Marquette	95	1879	Monroe	101		10
Minnesota	Moorhead	91	Breckenridge	96	1876	Saint Paul	99	1870	7
Do	Saint Paul	90	Saint Paul	94	1874	New Ulm	98		6
Mississippi	Vicksburg	97	Vicksburg	101	1881	Brookhaven	100	1875	5
Do			Starkville	95	1882	Fayette	99	1881	7
Missouri	Saint Louis	93	Saint Louis	99	1881	Allenton	101		4
Do			Springfield	98	1882	Saint Louis	100		39
Montana	Fort Assinaboine	99	Fort Keogh	104	1881	Fort Benton	104		10
Do	Fort Benton	100	Fort Benton	101	1881	Fort Shaw	101		7
Nebraska	North Platte	94	North Platte	101	1876	Fort McPherson	108	1876	13
Do	Omaha	93	Omaha	98	1881	Fort Lincoln	108	1881	1
Nevada			Winnemucca	95	1881	Camp Halleck	111	1871	15
New Hampshire	Mount Washington	67	Mount Washington	71	1878	Fort Constitution	96	'50? '52?	34
Do						Dunbarton	100	1876	5
New Jersey	Sandy Hook	91	Sandy Hook	97	1874	Atco	102	1875	8
Do	Atlantic City	87	Squan Beach	95	1875	Rio Grande	102	1875	1
New Mexico	Fort Craig	104	La Mesilla	108	1881	Fort McRae	120	1873	11
Do			Albuquerque	102	1879	Albuquerque	114	1857	18
New York	Oswego	90	Oswego	98	1875	Fort Hamilton	106	1825	39
Do	New York City	92	New York City	95	1875	Newburg	102		40
North Carolina	Wilmington	90	Wilmington	100	1880	Weldon	103	1880	7
Do	Kitty Hawk	91	Kitty Hawk	99	1880	Fort Johnson	99		57
Ohio	Cincinnati	93	Cincinnati	98.5	1874	College Hill	100	1881	04
Do	Cleveland	84	Cleveland	96	1874	Ruggles	100	1879	7
Oregon	Ashland	91	Umatilla	103	1878, 1880	Fort Dalles	104		15
Do	Portland	89	Portland	99	1876	Fort Haskins	102		8
Pennsylvania	Pittsburg	95	Pittsburg	98	1874	Carlisle Barracks	100		37
Do	Philadelphia	93	Philadelphia	97	1874	Mount Joy	100		10
Rhode Island	Narragansett Pier	91	Newport	89	1876	Providence	97		35
South Carolina	Charleston	89	Charleston	100	1877, 1880	Charleston	95		105
Do						Aiken	102	1881	4
Tennessee	Memphis	96	Memphis	100	1881	Humboldt	104	'71? '74?	4
Do	Nashville	92	Nashville	99	1874	Glenwood Cottage	91		11
Texas	Fort Davis	97	Fort Davis	111	1881	Fort Ringgold	114	1877	32
Do	El Paso	112	El Paso	113	1883	Fort Duncan	112	1860	31
Utah	Salt Lake City	92	Salt Lake City	100	1883	Mount Carmel	107	1876	3
Do						Fort Crittenden	103	1859	3
Vermont			Burlington	94	1878	Lunenburg	98		10
Virginia	Norfolk	92	Norfolk	102	1874	Accotink	98	1881	7
Do	Cape Henry	90	Cape Henry	98	1874	Fortress Monroe	97		36
Washington Territory			Dayton	97	1880	Fort Walla Walla	106	1876	12
West Virginia			Morgantown	93	1874	Weston	94	1875	2
Wisconsin	La Crosse	88	La Crosse	98	1874	Fort Howard	100		30
Do	Milwaukee	84	Milwaukee	94	1874	Milwaukee	100	1870	11
Wyoming	Cheyenne	93	Cheyenne	97	1880, 1881	Fort Fred Steele	104	1871	15

ington Territory, on the 23d, to 40° at Olympia, Washington Territory, on the 21st.

Middle Pacific coast region.—From 16° at Cape Mendocino, California, on the 25th, to 33° at Red Bluff, California, on the 30th.

South Pacific coast region.—From 22° at San Diego, California, on the 14th, to 40° at Los Angeles, California, on the 30th.

FROSTS.

During June, 1884, frosts occurred in the various states as follows:

Colorado.—Summit of Pike's Peak, 9th, 14th.

Connecticut.—Winsted, 14th; New Haven, 15th and 16th, in the suburbs; New London, 15th; Hartford, 15th.

Illinois.—Sycamore, 10th, 11th.

Iowa.—Independence, 12th, 13th, 17th, 21st, 22d.

Kansas.—Wyandotte, 10th, 11th.

Maine.—Bangor, 14th, 15th, killing vegetation to a large extent on the first mentioned date; Portland, 14th; Cornish, 2d, 6th, 14th; Gardiner, 1st, 2d, 14th, 15th; Orono, 14th.

Massachusetts.—Boston, 16th; Milton, 1st; Westborough, 2d, 15th; Fall River, 15th; Rowe, 15th.

Michigan.—Traverse City, 10th.

Minnesota.—Chester, 26th.

Nevada.—Carson City, 15th.

New Jersey.—Somerville, 4th, 15th, 16th; Readington, 15th, 16th; Vineland, 16th; Salem City, 1st, 16th, 28th; Caldwell, 15th and 16th, causing some damage to vegetation, and on the 29th, very light.

New York.—North Volney, 14th; Factoryville, 15th; Humphrey, 14th, 15th, 16th.

North Carolina.—New River Inlet: a light frost is reported to have occurred at points twenty-five miles northeast of this station, on the 2d.

Ohio.—Margaretta, 9th, 19th, 21st.

Pennsylvania.—Dyberry, 15th, 16th; Blooming Grove, 15th; Wellsboro, 1st, 16th; Quakertown, 16th; Troy, 14th, 15th; Drifton, 15th; Catawissa, 15th and 16th, very injurious to fruit and vegetables in exposed places.

Rhode Island.—Point Judith, 15th, farmers in the vicinity report that gardens were damaged considerably; Providence, 14th, 15th.

Vermont.—Woodstock, 1st; Strafford, 15th.

Wisconsin.—Neillsville, 10th.

The following notes relating to the damaging frosts of the 15th and 16th have been received:

Boston, Massachusetts, 15th: reports from various parts of New England state that the heavy frost on night of the 14–15th, caused considerable damage to growing crops. The Cape Cod district reports that the prospect for a cranberry crop is entirely ruined. Hundreds of acres were blighted, involving a loss of many thousands of dollars. Potatoes and corn and vines of all kinds were also seriously affected. Much of the corn will have to be replanted, and, owing to the lateness of the season, a short crop will be the result. In Norfolk county, Massachusetts, entire crops of vegetables were destroyed, and farmers who make a specialty of early produce will suffer extensively. In nearly all sections the growth of the crops was retarded.

Port Jefferson, Long Island, 16th: there was a heavy white frost last night on this part of Long Island, destroying potatoes, strawberries, and all vegetables. It is impossible to estimate the amount of damage done.

Philadelphia, Pennsylvania, 16th: advices from southern New Jersey say that the thermometer at sunrise this morning marked 38°. There was considerable frost in meadows and low places. It is feared much damage will be done to watermelons, citrons, and other tender vegetation, which has already suffered much from the recent cold winds.

Providence, Rhode Island: during the night of the 14–15th a damaging frost occurred; a frost at so late a date in this region is of rare occurrence.

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United states and Canada, as determined by the reports from nearly eight hundred stations, is exhibited on chart iii.

The first column of the following table shows the average precipitation for June, 1884, in the several geographical districts; the second column shows the June average for several years, and in the third column is given the excess or deficiency of June, 1884, as compared with the average for several years:

Average precipitation for June, 1884.

Districts.	Average for June. Signal-Service observations.		Comparison of June, 1884, with the average for several years.
	For several years.	For 1884.	
	Inches.	*Inches*	*Inches,*
New England	3.91	3.29	0.62 deficiency.
Middle Atlantic states	3.64	3.42	0.22 deficiency.
South Atlantic states	4.84	6.18	1.34 excess.
Florida peninsula	5.14	6.04	0.90 excess.
Eastern Gulf states	4.44	8.11	3.67 excess.
Western Gulf states	3.81	4.70	0.89 excess.
Rio Grande valley	2.21	1.38	0.83 deficiency.
Tennessee	4.22	7.09	2.87 excess.
Ohio valley	4.62	2.95	1.67 deficiency.
Lower lake region	3.52	2.24	1.28 deficiency.
Upper lake region	4.12	2.31	1.81 deficiency.
Extreme northwest	4.31	2.04	2.27 deficiency.
Upper Mississippi valley	5.82	4.00	1.82 deficiency.
Missouri valley	5.42	3.56	1.86 deficiency.
Northern slope	2.42	2.68	0.26 excess.
Middle slope	2.03	5.33	3.30 excess.
Southern slope	2.49	2.57	0.08 excess.
Southern plateau	0.34	0.61	0.27 excess.
Northern plateau	0.79	3.42	2.63 excess.
North Pacific coast region	1.14	2.17	1.03 excess.
Middle Pacific coast region	0.15	1.66	1.51 excess.
South Pacific coast region	0.03	0.57	0.54 excess.
Mount Washington, N. H.	9.60	8.08	1.52 deficiency.
Pike's Peak, Colo.	1.92	0.94	0.98 deficiency.
Salt Lake City, Utah	0.71	0.33	0.38 deficiency.

The reports from the various stations show that the precipitation for June, 1884, exceeded the average at all stations on the Pacific coast, in the northern and southern plateau districts, in the western portions of Kansas and Texas, along the immediate western Gulf coast, in Tennessee and in the states bordering on the Atlantic and Gulf coasts from Maryland to Louisiana. Chart iii. shows the area of greatest precipitation to occupy the eastern Gulf states, where the average (see table) as determined by the reports from seven Signal Service stations, is slightly over eight inches, or nearly double the June average for a series of years, while several of the cotton region stations in Georgia and South Carolina report monthly precipitations of from ten to twelve inches. On the Pacific coast the June precipitation has been phenomenal; in Oregon and Washington Territory about double the average amount of rain fell, and in California, where the June average is about one-tenth inch, the amount for June, 1884, was more than ten times as great. In ten of the thirteen years record (from 1871 to 1883 inclusive) at San Francisco, the June precipitation has not exceeded five-hundredths inch, while in the present year the amount was 2.57, or about half inch more than the total amount for the entire period. The Signal Service observer at Sacramento, reports the following: "The rainfall for June, 1884, has never been equaled in the same month since the settlement of this part of the country in 1849, and in only one instance during that period has the June precipitation approached the unprecedented amount for June of the present year, viz: 1.10 in 1875. Reports from all parts of the state show that hay and small fruits were badly damaged, but the benefits derived by grain, hops and the later fruits more than compensate for the the losses sustained by the other crops." Although the table of average precipitation shows a deficiency of more than one-half inch for the district of New England, the monthly rainfall was excessive in eastern Massachusetts, Rhode Island (except at Block Island), Connecticut, and in the vicinity of New York City, being due to the heavy rains which fell on the 25th

and 26th, in connection with the passage of low area vi. With the exception of the districts named above the precipitation for June has been below the average, the deficiencies being most marked in the extreme northwest, upper lake region, upper Mississippi and Missouri valleys, and in northern New England, where they averaged from one and three-fourths to two and one-fourth inches; in the Ohio valley and lower lake region, the deficiencies averaged about one and one-half inches; in central Texas, western Colorado, and in Utah, the deficiencies were generally less than one inch.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average precipitation. Voluntary observers report the following notes in connection with this subject.

Arkansas.—Lead Hill, Boone county: monthly precipitation, 3.57 is 3.12 below the June average of the two preceding years.

Georgia.—Milledgeville, Baldwin county: monthly precipitation, 7.64, is the heaviest June rainfall for many years.

Mr. Thomas Scott of Forsyth, Monroe county, reports the monthly precipitation, 6.73, to be the heaviest that has occurred in June during the last forty-one years.

Illinois.—Swanwick, Perry county: monthly precipitation, 5.66 is 0.96 above the June average of the last three years.

Anna, Union county: monthly precipitation, 7.44, is 1.40 above the June average of the last nine years.

Riley, McHenry county: monthly precipitation, 4.22, is 0.12 above the June average of the last twenty-three years. The largest June precipitation of that period, 9.17, occurred in 1868; the smallest, 0.64, occurred in 1863.

Mattoon, Coles county: monthly precipitation, 6.87, is 2.27 above the June average of the four preceding years.

Collinsville, Madison county: monthly precipitation, 3.73, is 1.75 below the June average.

Morrison, Whiteside county: monthly precipitation, 4.83, is 1.13 below June average of the last nine years.

Indiana.—Wabash, Wabash county: monthly precipitation, 2.23, is 2.33 below the June average of the last eight years.

Logansport, Cass county: monthly precipitation, 4.25, is 0.49 above the June average of the last twenty-five years.

Kansas.—Independence, Montgomery county: monthly precipitation, 2.52, is 3.30 below the June average of the last twelve years.

Lawrence, Douglas county: monthly precipitation, 3.81, is 1.30 below the June average of the last sixteen years.

Wellington, Sumner county: monthly precipitation, 4.21, is 0.18 below the average of the last six years.

Maine.—Gardiner, Kennebec county: monthly precipitation, 1.22, is 2.00 below the June average of the last forty-eight years, and is, with the exception of 1.16 for June, 1877, the smallest for that period.

Maryland.—Fallston, Harford county: monthly precipitation, 5.00, is 0.86 above the June average of the last thirteen years.

New Hampshire.—Antrim, Hillsborough county: monthly precipitation, 1.30, is 2.79 below the June average of the last ten years.

New Jersey.—South Orange, Essex county: monthly precipitation, 6.02, is 2.65 above the June average of the last fourteen years.

New York.—Palermo, Oswego county: monthly precipitation, 1.27, is 1.40 below the June average of the last thirty-one years.

North Volney, Oswego county: monthly precipitation, 1.15, is 1.97 below the June average of the last twelve years, and is the smallest June precipitation for that period.

Dannemora, Clinton county: monthly rainfall, 2.23, is the smallest June precipitation of the last five years.

Ohio.—Wauseon, Fulton county: monthly precipitation, 2.79, is 1.85 below the June average of the last twelve years.

Table of excessive and greatest monthly precipitation.—June, 1884.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.	Amount.		Date.	Amt.	Amount.
Alabama.				*Indiana*—Cont'd.			
Clintonville	7 to 10	4.21	15.65	Indianapolis	8, 9	3.77	
Do	14, 15, 16	10.14		Vevay	13	2.15	
Clanton	4, 5	2.50	12.94	*Iowa.*			
Do	14, 15	3.50		Independence	23, 24	2.85	
Do	29, 30	3.00		*Kansas.*			
Auburn	28	4.00	11.52	Dodge City	17	2.04	7.64
Montgomery	29, 30	3.97	10.26	Wellington	22, 23	3.45	
Opelika	13, 14	3.49	9.97	Manhattan	21, 22	2.30	
Do	28	2.38		Westmoreland	21, 22	3.25	
Greenville	29, 30	2.01	9.72	Atchison	7, 8	2.05	
Eufaula	7	2.38	8.60	Fort Scott	17	2.00	
Jacksonville	11, 12	1.82	8.56	*Louisiana.*			
Mount Vernon Barracks	26, 27, 28	2.86	7.75	Alexandria	3, 4	2.62	9.26
Green Springs	30	2.60	7.57	Do	25	2.08	
Calera	29, 30	1.80	7.55	Do	28	2.75	
Greensborough	28, 29	2.88	7.39	New Orleans	30	1.75	8.60
Gadsden	29, 30	2.15	7.20	Baton Rouge			6.20
Mobile	5, 6	1.67	7.01	*Maryland.*			
Marion	29, 30	1.66	6.55	Great Falls	14, 15	2.47	
Prattville	14, 15	3.50	6.56	*Massachusetts.*			
Do	29, 30	2.50		Taunton	25, 26	3.50	
Edwardsville	23	2.00	6.38	Fall River	25, 26	2.95	
Trinity			6.03	Milton	25	2.90	
Tuscaloosa			6.02	Boston	25, 26	2.73	
Dadeville			6.00	Westborough	25, 26	2.27	
Fayette	22	3.00		Somerset	25, 26	2.71	
Selma	29, 30	2.39		Princeton	25, 26	2.52	
Arizona.				Worcester	25	2.17	
Fort Apache	14	1.60		Thatcher's Island	26, 26	1.94	
Arkansas.				*Michigan.*			
Madison			6.67	Mottville	2	2.75	
Fayetteville	18	2.00		Northport	21	2.50	
Arkansas City	16, 17	2.20		Marshall Mills	18	2.30	
Connecticut.				Grand Rapids	25, 26	2.18	
New London	25, 26	5.97	6.29	*Minnesota.*			
New Haven	25, 26	4.85		Fort Snelling	7	2.54	
Voluntown	26	4.50		*Mississippi.*			
Bethel	26	3.50		Macon	15, 16	2.48	7.76
Dakota.				Holly Springs	29, 30	2.17	7.62
Webster	6, 7	2.53	8.01	Columbus	3, 4	2.62	7.01
Do	24, 25	3.07		Brookhaven	25, 26	1.97	6.90
Richardton			6.00	Aberdeen	16	2.08	6.74
Morriston	7, 8	2.03		Oxford	3	2.50	6.21
District of Columbia				Corinth	4, 5, 6	5.36	
Receiving Reservoir	11, 12	3.19	8.12	Hernando	3, 4, 5	3.39	
	14, 15	3.25		Edwards	3, 4	2.33	
Washington City	10, 11	2.41	6.95	Jackson	3	2.02	
Do	13, 14	3.46		*Missouri.*			
Distributing Reservoir	14, 15	2.79	6.20	Saint Charles			6.55
West Washington	12, 13	3.03	6.17	*Montana.*			
Florida.				Fort Custer	11, 12	2.06	
Fort Barrancas	24, 25	2.34	11.99	*Nebraska.*			
Do	28, 29	2.36		Omaha	21, 22	1.80	6.11
Archer	10, 11	3.93	11.66	*New Hampshire.*			
Do	22	2.10		Mt. Washington	9, 10	3.10	8.08
Sanford	11	2.04	9.57	*New Jersey.*			
Limona	11	4.75	9.45	Readington	25, 26	8.10	8.80
Live Oak	24	2.19	9.32	Somerville	25, 26	5.60	6.20
Pensacola	14, 15	1.96	7.84	South Orange	25, 26	5.42	6.02
Saint Augustine	22	4.20	7.43	Caldwell	25, 26	5.40	5.66
Mayport	16	2.63	7.23	Lambertville	25	4.39	
Jacksonville	22	1.48	6.89	Sandy Hook	25, 26	3.62	
Cedar Keys	22, 23	2.96	6.68	Phillipsburg	25, 26	3.33	
Key West	21, 22	2.10		Barnegat City	26	2.03	
Georgia.				*New York.*			
Griffin	12	2.48	12.22	Humphrey	23	3.38	7.02
Do	15	2.00		White Plains	25, 26	6.20	6.40
Gainesville	24, 25	2.88	12.10	Fort Columbus	26	4.87	5.45
Fort Gaines	10	2.05	11.40	Fort Hamilton	26	3.75	
Do	28, 29	4.67		New York City	25, 26	3.63	
Atlanta	30	1.42	10.73	David's Island	26	3.60	
Newnan			10.55	West Point	26	2.50	
Athens	21	2.44	10.46	*North Carolina.*			
Do	24, 25	3.74		Brevard	23, 24, 25	4.10	12.94
Do	12 to 15	4.20		Lenoir	24 to 27	4.00	10.30
Thomasville			10.45	Charlotte	11	2.84	9.47
West Point	14, 15	3.21	9.94	Highlands	23, 24	3.00	8.35
Do	30	2.00		Statesville			7.99
Toccoa	24, 25	3.94	9.78	Wilmington	11	1.83	7.94
Jesup	15, 16	2.95	9.45	Goldsborough			6.21
Savannah	23, 24	4.37	9.37	Raleigh	26	2.36	
Quitman	23, 24	2.01	9.13	Kitty Hawk	13, 14	3.16	
Macon	24, 25	2.24	8.56	Scott's Hill	14, 15	1.91	
Dalton	7	1.72	8.51	*Ohio.*			
Way Cross	24	2.30	7.97	Logan			6.61
Milledgeville			7.64	Cleveland	9, 10	3.00	
Cartersville			7.34	Toledo	9, 10	2.39	
Washington			6.74	*Oregon.*			
Forsyth			6.73	Lakeview	10	3.15	6.53
Illinois.				*Pennsylvania.*			
Petersburg	9, 10	1.95	9.35	Grampian Hills	10	8.00	9.85
Do	19, 20	2.10		West Chester	25, 26	6.08	7.52
Greenville	9, 10	2.05	8.15	Quakertown	25, 26	5.20	6.54
Golconda	6	3.24	7.52	Hulmeville	25, 26	4.76	
Anna	4	2.15	7.44	Wellsborough	24, 25	3.60	
Mattoon			6.87	Tamaqua	25, 26	2.40	
Springfield	8, 9	2.49	6.20	Haverford College Observatory	25, 26	4.83	
Rockford			6.16	Fallsington	25, 26	4.51	
Morrison	2	2.55		Chambersburg	25, 26	3.30	
Indiana.				Philadelphia	26	2.48	
Clinton	7	2.29	10.64	Germantown	25, 26	3.27	
Do	24	2.97		Blooming Grove	26	2.20	

Table of excessive and greatest monthly precipitation.—Cont'd—*June*, 1884.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.	Amount.		Date.	Amt.	Amount.
Penn'a.—Cont'd.				*Tenn.*—Cont'd.			
Catawissa	24, 25, 26	3.65		Cookville			6.60
Franklin	30	2.27		Grand Junction	5	2.08	6.36
Rhode Island.				Nashville	5, 6	1.91	6.53
Point Judith	26	4.96	5.82	Decatur			6.20
Narragansett Pier	26, 27	3.78		Florence			6.17
Providence	25, 26	3.20		Murfreesborough			6.08
South Carolina.				Milan	3 to 6	2.84	
Hardeeville	13	3.25	12.59	Bolivar	5	2.11	
Do	23, 24, 25	3.54		*Texas.*			
Greenwood			10.51	Cleburne	2, 3	9.10	10.09
Greenville	24, 25	4.37	9.09	Indianola	21, 22	4.20	7.56
Chester	21, 22	3.00	8.99	Sour Lake	3	3.07	6.95
Charleston	13, 14	2.50	8.25	Fort Elliott			6.86
Florence	27	2.90	7.39	Galveston	3, 4	2.50	6.84
Anderson	24	2.03	7.22	Do	19, 20	3.13	
Spartanburg	25	2.85	6.90	Paris			6.01
Branchville	15	2.05	6.35	Tyler	3	3.20	
Columbia	15	2.59		Clarkesville	19	3.21	
Yemassee	15	3.00		Brownsville	23, 24	1.75	
Blackville	23, 24	2.06		*Vermont.*			
Cheraw	26, 27	2.73		Newport	24, 25	2.05	
Tennessee.				*Virginia*			
Grief	6, 7	3.04	10.57	Snowville	8	2.30	7.80
Marysville	13	2.19	9.60	Norfolk	30	1.92	6.45
Parksville	6, 7	2.75	9.46	Fort Myer	13, 14	3.22	
Riddleton	25	2.30	9.21	Fort Monroe	30	2.45	
Chattanooga	6, 7	3.46	9.20	Wytheville	25, 26, 27	2.31	
Savannah	5, 6, 7	2.47	8.82	*West Virginia.*			
Henderson	5	2.76	8.16	Helvetia	23, 24, 25	2.74	
Lafayette	10	2.00	7.65	*Wisconsin.*			
Fostoria	5, 6, 7	2.60	7.04	Embarras	7, 8	3.10	8.35
Memphis			7.30	Do	22, 23	2.90	

Table of smallest monthly precipitation, June, 1884.

Station.	Amt.	Station.	Amt.
Arizona.		*Michigan.*	
Texas Hill	0.00	Manistique	0.97
Willcox	0.04	*Montana.*	
Wickenburg	0.06	Fort Shaw	0.97
San Simon	0.08	*Nevada.*	
Fort McDowell	0.09	Brown's	0.49
Tucson	0.10	Tecoma	0.50
Fort Bowie	0.12	Toano	0.55
Phœnix	0.15	Halleck	0.56
Fort Verde	0.23	Reno	0.80
Maricopa	0.32	*New Hampshire.*	
Prescott	0.32	Weir's Bridge	0.80
San Carlos	0.49	*New Mexico.*	
Fort Thomas	0.52	Lordsburg	0.00
California.		Fort Craig	0.37
Redding	0.00	*New York.*	
Bishop Creek	0.00	Madison Barracks	0.99
Daggett	0.00	*Oregon.*	
Deming	0.00	East Portland	0.12?
Indio	0.00	Ashland	0.24
Mammoth Tank	0.00	*Texas.*	
Mojave	0.00	Rio Grande City	0.02
Needles	0.00	El Paso	0.11
Fenner	0.05	*Utah.*	
Delano	0.22	Salt Lake City	0.33
San Diego	0.31	Kelton	0.35
Colton	0.32	Terrace	0.40
Poway	0.44	Nephi	0.50
Hydesville	0.63	Blue Creek	0.52
Keeler	0.80	Ogden	0.61
Hawthorne	0.89	Corinne	0.70
Sumner	0.90	Modesto	0.99
Willows	0.90	*Washington Territory.*	
Cape Mendocino	0.92	Pleasant Grove	0.47
Kingsburg	0.92	Ainsworth	0.90
Red Bluff	0.97	*Wyoming.*	
Colorado.		Fort Bridger	0.10
Pike's Peak	0.94	Fort Fred Steele	0.30
Dakota.			
Fort Meade	0.48		
Fort Buford	0.99		

Pennsylvania.—Dyberry, Wayne county: monthly precipitation, 1.27, is 2.00 below the June average of the last twelve years.

Texas.—New Ulm, Austin county: monthly precipitation, 2.82, is 1.25 below the June average of the last twelve years.

Vermont.—Woodstock, Windsor county: monthly precipitation, 1.88, is 1.58 below the June average of the last sixteen years.

Virginia.—Wytheville, Wythe county: monthly precipitation, 5.92, is 1.85 in excess of the June average for a period of twenty-one years, and has been exceeded but once in that time, viz: in 1875.

Variety Mills, Nelson county: monthly precipitation, 5.33, is 2.47 above the June average of the last six years.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 5.69, is 0.23 below the June average of the last eight years.

SNOW.

The observer at Red Bluff, California, states that reports from the lumber mills, thirty miles east of that place, on the 13th, announced that on that date snow fell to a depth of one foot.

MONTHLY SNOW-FALLS.

The following monthly snow-falls have been reported:

Summit, California, six inches; Cisco, California, three inches.

On the summit of Pike's Peak, Colorado, there remained on the ground at the close of the month twenty-four inches of unmelted snow.

SLEET.

Sleet was reported on the summit of Pike's Peak, Colorado, from the 1st to 4th, 6th, 7th, 10th, 16th, 18th, 21st, 22d, 26th.

HAIL.

Shelbyville, Shelby county, Illinois: a severe hail and rain storm passed over this place on the evening of the 3d.

Tipton, Moniteau county, Missouri: a very severe hail storm passed over this place on the afternoon of the 4th; it began at 1.20 p. m. and lasted twenty minutes; great damage was done to the growing corn.

Fort Totten, Dakota: a hail storm, lasting twenty minutes, occurred two miles east of the station between 3.40 and 5 p. m. of the 6th; the width of the storm's track was about two miles; no serious damage resulted.

Fall River, Bristol county, Massachusetts: the hail storm of the 7th, though of short duration, caused a great deal of damage; the early crops were destroyed and young poultry killed by the hailstones.

Emmettsburg, Palo Alto county, Iowa: a violent hail storm occurred on the afternoon of the 7th; much damage was done to buildings and growing crops.

Los Angeles, California: considerable damage was done at points twelve miles northeast of this station by a hail storm on the 13th.

Richardton, Stark county, Dakota: at 3 p. m. of the 18th, a very severe thunder storm, accompanied by very large hail occurred; during the storm the velocity of the wind was very high, causing the hail-stones to break all window glass of southern exposure.

Vandalia, Fayette county, Illinois: an unusually heavy rain storm, accompanied by large hail-stones, occurred in the southeastern part of this county on the 21st; great damage was done to the growing crops, and numerous bridges were washed away.

Charlotte, North Carolina: at about 3. p. m., of the 22d, a very destructive hail-storm visited Mecklenburg county; on several farms the crops of cotton, corn, and oats were entirely destroyed.

Denver, Colorado: a severe hail storm occurred at Central City, Gilpin county, on the afternoon of the 22d.

Blacksburg, Montgomery county, Virginia: during the evening of the 22d, hail stones about the size of partridge eggs fell, resulting in no serious damage.

Fort Maginnis, Montana: on the 23d, a severe hail-storm from the southeast began at 1.50 p. m., and continued for fifteen minutes. The hail stones were one inch in diameter and caused serious injury to the post garden; windows were also broken.

Independence, Montgomery county, Kansas: during the thunder-storm of the 24th, hail as large as quail eggs fell in places along the track of the storm; some damage was done to corn, fruit, and other crops.

Fort Buford, Dakota: the thunder-storm of the 26th, was accompanied by hail measuring three-fourths of an inch in diameter; no damage resulted.

Hail storms of less violence occurred in the various states and territories as follows:

Alabama.—Green Springs, 9th.

Arizona.—Fort Grant, 28th.

California.—Princeton, 4th; Los Angeles, 13th; Fort Bidwell, 23d.

Colorado.—West Las Animas, 5th, 6th, 9th, 16th; Pueblo, 9th, 16th, 20th; Denver, 14th; Pike's Peak, 27th, 28th, 30th.

Dakota.—Deadwood, 3d, 27th; Fort Bennett, 5th, 15th, 21st, 25th; Richardton, 6th, 14th; Fort Sully, 11th, 14th; Fort Yates, 17th; Fort Buford, 26th, 27th, 28th; Fort Lincoln, 28th; Bismarck, 28th.

Georgia.—Atlanta, 20th.

Illinois.—Polo, 1st, 18th; Chicago, 2d.

Indiana.—Spiceland, 1st; Indianapolis, 9th; Clinton, 24th.

Iowa.—Indianola, 13th.

Kansas.—Dodge City, 6th; Wyandotte, 7th, 8th, 13th; Sherlock, 11th; Salina, 25th.

Maine.—Portland, 6th.

Massachusetts.—Taunton, 7th.

Michigan.—Marshall, 24th.

Missouri.—Saint Louis, 3d, 8th.

Montana.—Fort Custer, 5th, 10th; Fort Assinaboine, 13th, 28th; Fort Ellis, 27th.

Nebraska.—Red Willow, 11th, 25th; Yutan, De Soto, and Marquette, 25th; North Platte, 30th.

New Hampshire.—Mount Washington, 3d, 6th, 7th.

New Mexico.—Fort Union, 30th.

New York.—Humphrey, 9th.

North Carolina.—Statesville, 11th; Brevard, 21st.

Ohio.—Westerville, 2d.

Pennsylvania.—Wellsborough 24th.

Tennessee.—Ashwood, 7th.

Texas.—Fort Concho, 2d; Cleburne, 2d, 3d; Clarksville, 8th; Fort Stockton, 12th.

Vermont.—Charlotte and Lunenburg, 6th.

Virginia.—Norfolk, 8th; Wytheville, 10th.

Washington Territory.—Bainbridge Island, 3d.

Wisconsin.—Embarras, 8th.

RAIN FROM A CLOUDLESS SKY.

Mr. A. C. Willsams, of Elk Falls, Elk County, Kansas, reports that rain fell from a cloudless sky at that place on the 16th.

Table of rainy and cloudy days, relative humidity, and dew-point for June, 1884.

Districts.	Rainy days.	Cloudy days.	Rel. humidity. *	Dew-point.
			Percentages.	°
New England	From 5 to 7	From 2 to 7	From 66.0 to 83.8	From 48.0 to 57.1
Middle Atlantic states	" 4 " 14	" 3 " 12	" 58.6 " 85.4	" 55.9 " 64.2
South Atlantic states	" 9 " 21	" 6 " 16	" 74.7 " 84.9	" 61.5 " 69.3
Florida peninsula	" 10 " 21	" 3 " 5	" 74.2 " 78.6	" 69.0 " 72.5
East Gulf states	" 13 " 19	" 4 " 11	" 72.4 " 79.1	" 66.6 " 69.2
West Gulf states	" 6 " 12	" 0 " 4	" 73.7 " 80.7	" 65.8 " 72.8
Rio Grande valley	" 1 " 11	" 1 " 2	" 62.9 " 80.2	" 69.9 " 72.3
Ohio valley	" 9 " 12	" 6 " 12	" 64.6 " 76.6	" 59.7 " 65.8
Tennessee	" 17 " 19	" 10 " 13	" 75.7 " 80.7	" 62.4 " 65.2
Lower lake region	" 4 " 13	" 1 " 7	" 67.4 " 73.7	" 55.2 " 60.3
Upper lake region	" 6 " 15	" 2 " 8	" 66.9 " 78.4	" 47.5 " 56.8
Extreme northwest	" 7 " 10	" 2 " 8	" 60.0 " 78.8	" 52.8 " 60.7
Upper Mississippi valley	" 11 " 18	" 4 " 12	" 68.7 " 82.9	" 58.6 " 67.7
Missouri valley	" 7 " 10	" 1 " 4	" 67.4 " 75.4	" 59.3 " 63.3
Northern slope	" 7 " 16	" 1 " 9	" 51.5 " 70.4	" 40.7 " 59.6
Middle slope	" 9 " 13	" 0 " 4	" 53.4 " 74.2	" 47.2 " 62.3
Southern slope	" 6 " 14	" 1 " 3	" 57.6 " 67.9	" 53.6 " 64.3
Southern plateau	" 2 " 8	" 1 " 3	" 24.9 " 59.7	" 33.0 " 43.4
Northern plateau	" 7 " 18	" 7 " 8	" 60.7 " 67.4	" 49.2 " 55.6
North Pacific coast region	" 14 " 16	" 11 " 18	" 67.3 " 86.9	" 50.0 " 51.2
Middle Pacific coast region	" 7 " 19	" 6 " 14	" 59.4 " 85.5	" 50.2 " 55.1
South Pacific coast region	" 0 " 6	" 1 " 13	" 41.9 " 78.4	" 52.6 " 57.1
Mt. Washington, N. H.	Thirteen	Two	78.2	41.7
Pike's Peak, Colo.	Ten	Three	79.7	25.0
Salt Lake City, Utah	Four	Two	39.4	41.0

* Relative humidity corrected for altitude.

COTTON REGION REPORTS.

From the following table it will be seen that the precipitation for June, 1884, in the cotton regions exceeded the average for the same month in the two preceding years, in all of the districts, except that of New Orleans, where a deficiency of 1.35 is shown. For the district of Atlanta the excess is nearly six inches, and it exceeds two inches in the districts of Savannah, Montgomery, and Mobile; in the remaining districts the excesses varied from about normal for Vicksburg to 1.68 inches for Augusta. The means of the maximum and minimum temperatures were generally lower by from 1° to 6° in all districts.

Temperature and rainfall data for the cotton districts, June.

Districts.	Rainfall.			Temperature.							
				Maximum.			Minimum.			Extremes for June, 1884.	
	Average for June of two preceding years.	Average for June, 1884.	Departures.	Mean for June of two preceding years.	Mean for June, 1884.	Departures.	Mean for June of two preceding years.	Mean for June, 1884.	Departures.	Max.	Min.
				°	°	°	°	°	°	°	°
New Orleans	5.54	4.19	— 1.35	90.4	89.4	— 1.0	72.1	68.1	— 4.0	102	53
Savannah	5.45	8.05	+ 2.60	90.5	85.7	— 4.8	70.8	65.1	— 5.7	106	41
Charleston	4.88	6.28	+ 1.40	90.2	84.9	— 5.3	68.2	64.8	— 3.4	98	48
Atlanta	3.36	9.13	+ 5.77	88.7	82.5	— 6.2	66.8	62.6	— 4.2	98	48
Wilmington	4.64	6.01	+ 1.37	89.4	84.4	— 5.0	66.4	62.5	— 3.9	100	44
Memphis	3.71	5.29	+ 1.58	89.8	83.3	— 6.5	67.1	65.4	— 1.7	100	50
Galveston	2.19	3.66	+ 1.47	92.9	90.8	— 2.1	71.3	67.9	— 3.4	100	50
Vicksburg	3.44	3.54	+ 0.10	91.0	87.7	— 3.3	69.4	67.5	— 1.9	98	57
Montgomery	4.26	7.15	+ 2.89	90.4	85.2	— 5.2	69.4	64.0	— 5.4	101	45
Augusta	4.66	6.34	+ 1.68	90.4	85.2	— 5.2	68.3	63.6	— 4.7	103	43
Little Rock	2.55	3.25	+ 0.70	90.6	87.7	— 2.9	65.7	65.8	+ 0.1	103	46
Mobile	3.57	6.30	+ 2.73	93.6	87.9	— 5.7	69.2	66.5	— 2.7	100	46

WINDS.

The most frequent directions of the wind for the month of June, 1884, are shown on chart ii. by arrows flying with the wind. In western New York, New England, and on the middle Atlantic coast the most frequent directions were from south to west; in the southern slope, along the immediate Gulf coast, in the Missouri valley and extreme northwest, they were generally from the south; in the lake region, upper Mississippi and Ohio valleys, and Tennessee, they were from northeast to southeast; on the Pacific coast, from north to west.

TOTAL MOVEMENTS OF THE AIR.

[*In miles.*]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England	Block Island, R. I.	8,816	Eastport, Maine	3,341
Middle Atlantic states	Del. Breakwater, Del.	11,441	Lynchburg, Va.	2,053
South Atlantic states	Kitty Hawk, N. C.	10,298	Augusta, Ga.	2,929
Florida peninsula	Cedar Keys	6,885	Sanford	4,627
Eastern Gulf states	Pensacola, Fla	5,401	Vicksburg, Miss.	3,675
Western Gulf states	Indianola, Tex.	6,217	Fort Smith, Ark	2,466
Rio Grande valley	Rio Grande City, Tex.	5,294	Brownsville, Tex.	4,459
Tennessee	Nashville	3,524	Chattanooga	3,034
Ohio valley	Louisville, Ky.	3,995	Cincinnati, Ohio	3,078
Lower lake region	Sandusky, Ohio	8,150	Toledo, Ohio	3,484
Upper lake region	Escanaba, Mich.	5,776	Marquette, Mich.	3,974
Extreme northwest	Moorhead, Minn	8,632	Bismarck, Dak.	5,804
Upper Mississippi valley	Saint Louis, Mo.	6,581	Keokuk, Iowa	2,077
Missouri valley	Huron, Dak.	6,728	Leavenworth, Kans.	2,389
Northern slope	Fort Assinaboine, Mont	7,250	Deadwood, Dak.	4,124
Middle slope	Dodge City, Kan	7,556	West Las Animas	5,174
Southern slope	Fort Stockton, Tex.	6,661	Fort Davis, Tex.	4,358
Southern plateau	Fts. Grant & Verde, Ariz	5,028	El Paso, Tex	3,116
Middle Plateau	Salt Lake City, Utah	4,875		
Northern plateau	Dayton, Wash. T.	3,777	Lewiston, Idaho	1,010
North Pacific coast region	Fort Canby, Wash T.	6,574	Olympia, Wash. T.	1,300
Middle Pacific coast region	Cape Mendocino, Cal.	12,665	Red Bluff, Cal.	4,733
South Pacific coast region	San Diego, Cal	4,478	Yuma, Ariz.	3,553

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements of the air were 19,090 and 13,244 miles, respectively.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire, maximum velocities of fifty miles or more per hour occurred as follows: 60, nw., 4th; 50, nw., 5th; 64, nw., 7th; 56, nw., 8th; 64, w., 9th; 69, nw., 13th; 72, nw., 16th; 74, nw., 21st; 68, sw., 24th; 68, sw., 25th.

The following high velocities were reported from Pike's Peak, Colorado: 64, sw., 10th; 78, sw., 11th; 92, sw., 12th; 60, sw., 13th; 60, s., 14th; 70, w., 16th; 66, w., 24th; 52, w., 26th.

Other stations reporting velocities of fifty miles or more per hour are as follows:

Cape Mendocino, California, 54, se., 2d; 64, se., 23d.
Omaha, Nebraska, 56, n., 25th.
Sandy Hook, New Jersey; 50, e., 26th.
Barnegat, New Jersey, 59, e., 26th.
Atlantic City, New Jersey, 52, ne., 26th.
Delaware Breakwater, Delaware, 56, ne., 14th, 26th, and 27th.

LOCAL STORMS.

California.—Red Bluff: a violent storm, causing great damage to the grass crop, occurred twelve miles south of this place on the 2d. It is estimated that the rain storm of the 13th caused damage to the amount of $100,000 in this (Tehama) county.

San Francisco, 12th: the heavy rains of the past two weeks have caused great damage to crops in this state. The June rains of the present year have been the heaviest that have occurred in that month since 1870. Reports from fifteen different localities state that the hay crop has been almost entirely destroyed, and that rye and barley have been severely damaged.

Dr. J. B. Trembley, of Oakland, reports that from the 7th to 13th, an almost continuous storm prevailed, which, for duration, violence and the amount of precipitation, has never been equaled in California during the month of June.

Connecticut.—New London: the rainfall accompanying the storm on the 25th and 26th was the heaviest that has been recorded at this place since Signal Service observations were begun, in 1871. The total precipitation during the storm was 5.97 inches, nearly all of which fell within twelve hours.

Dakota.—Huron: much damage was done to the telegraph wires and poles by lightning during the storm of the 7th. Reports from points northwest of this station state that the rainfall accompanying the storm was unusually heavy. On the 15th a severe storm which destroyed several small buildings, occurred at Blunt, a town about eighty miles west of Huron.

Delaware.—Delaware Breakwater: a violent northeasterly gale occurred on the 26th, the wind reaching a velocity of fifty-six miles per hour. The bark "Vasco de Gama" from Cienfuegos to Philadelphia, with a cargo of sugar valued at $50,000, parted her cables and dragged anchor while lying at this place. To prevent sinking she was run ashore.

Illinois.—Havana, Mason county: at 4 p. m. of the 22d at a point six miles southeast of this place, a small funnel-shaped cloud was observed passing from southwest to northeast. The cloud is described as having resembled the trunk of an elephant and was accompanied by terrific peals of thunder. There was very little wind and no rain. When the end of the cloud struck the earth a dense black smoke arose which enveloped it. The cloud afterwards divided into two parts—one part passing through a cornfield and the other through a field of wheat, leaving well-marked narrow tracks.

Iowa.—Des Moines: reports from Crawford county state that a destructive storm swept through the Bayer valley between 10 and 11 p. m. of the 14th. Considerable damage was done to the buildings and crops along the Bayer valley and on the adjacent hills.

Kentucky.—Louisville: the steamer "J. & W. Gaff," from Cincinnati to Memphis, reports having encountered a very severe storm on the Ohio river, during the afternoon of the 8th, when about sixteen miles below Madison, Indiana. The steamer had both smoke-stacks blown over, and sustained other damage. At Louisville a thunder-storm with heavy rain prevailed but no damage was done.

Maryland.—Annapolis: during the storm of the 13th the sloop "Rachel Bromall" was sunk near Thomas' Point.

Baltimore: the storm on the night of the 26–27th was very severe in Washington and Carroll counties. The Western Maryland railroad was badly washed in several places, one of the breaks being eight hundred yards long. Over one hundred head of cattle on the farms bordering on Double-Pipe Creek were drowned. The Monocacy river rose to a greater height than has been known for twenty-five years. In Cecil county, bridges, mills and dwellings were carried away. One of the most serious losses was that caused by the breaking of the Chesapeake and Ohio Canal, near Harper's Ferry, where about three hundred feet of the bank were washed away. On the 27th it was estimated that the losses caused by this storm in Carroll, Cecil, Frederick, Harford and Washington counties would aggregate $500,000.

Massachusetts.—New Bedford: the storm during the night of the 25–26th was very severe. The streets were flooded to a depth of one foot. Much damage was done by lightning.

Michigan.—Marshall, Calhoun county: a severe squall, which blew down trees and caused other damage, occurred between 1.45 and 2 p. m. of the 24th.

Minnesota.—Minneapolis: a severe wind and rain storm occurred on the afternoon of the 12th, during which the Coliseum building was struck by lightning and set on fire.

Montana.—Helena: at 4 p. m. of the 7th a "cloud-burst" occurred at Unionville, four miles south of this station; no rain fell at Helena, although the streets were flooded with water from the overflow at Unionville. On the 22d a "cloud-burst" occurred in the mountains near Corbin's, twenty-two miles south of Helena. A volume of water eight feet in depth rushed down the gulch toward Jefferson, and in its course washed away a house, drowning three of the occupants. An alarm was telephoned to Jefferson and the people of that place took refuge in the neighboring hills, but the water spread before reaching the town, and only a few small frame buildings were washed away. One-fourth of a mile of the Helena and Jefferson railroad track was washed away, and considerable damage was done to crops, and to goods in the stores on the ranches.

Nebraska.—Omaha: at 12.09 p. m. of the 25th, a severe thunder storm passed over this city from north to south. The wind attained a velocity of fifty-six miles per hour, causing considerable damage to outbuildings, signs, etc.

Nevada.—Despatches received at San Francisco, California, on the 10th, from Rye Patch, Humboldt county, Nevada, report the occurrence of a "cloud-burst" in the Humboldt mountains. The surrounding valleys were flooded and the Central Pacific railroad track was badly washed in places for a distance of thirty miles.

New Jersey.—Somers Point: a severe storm prevailed on the 26th; trees were uprooted and buildings damaged; three small vessels in the harbor were blown ashore, one of which was sunk.

Cape May: during the storm of the 26th, the schooner "A. H. Hurlburt" sprung a leak and put into this port for repairs. The wind attained a velocity of forty-eight miles per hour at Cape May.

Barnegat City: a northeasterly gale set in at 5 p. m. of the 26th, and continued with great force during the day. At 7 a. m. the wind attained its greatest force, fifty-nine miles per hour from the east. Cars standing on the narrow-gauge railroad were blown over, and window shutters, etc., were wrenched from the buildings. The schooner "L. & A. Babcock," from Philadelphia to Boston, sprung a leak, and, to prevent foundering at sea, was beached about two miles north of Barnegat at about 5 p. m. The vessel went to pieces in less than two hours after striking the bar and six of her crew were drowned. This storm is considered to have been the severest that has occurred during the month of June, since the establishment of the signal station at this place.

New York.—Albany: a destructive storm is reported to have occurred at Knowersville, (twenty miles west), at about 11.30 a. m. of the 9th; considerable damage was caused by lightning during the storm.

Humphrey, Cattaraugus county: the storm on the afternoon of the 23d was one of the severest that has occurred in this vicinity for several years. More than three inches of rain fell

which flooded streams and washed away bridges, fencing, etc. Several barns were struck by lightning and with their contents were burned.

Rochester: during the storm on the 23d, the rainfall at Clyde, Wayne county, was the heaviest ever known to have fallen at that place. The sewers were not capable of carrying off the large volume of water, and for one hour the streets were flooded; several objects were struck by lightning. At Rochester very heavy rain fell from 12.10 to 12.45 p. m., 0.89 inch having fallen in that time.

Saratoga: a violent wind and rain storm passed over this part of the state on the afternoon of the 24th; many barns and other buildings were struck by lightning. Reports from Litchfield Springs state that the storm was also severe at that place and that numerous buildings were damaged by lightning.

New York City: light showers of rain fell during the afternoon of the 25th; after 9 p. m. a heavy rain began and continued, with a few short intervals, until noon of the 26th, the total rainfall during the storm being 3.63 inches. Since the establishment of this station in November, 1870, there have been only two instances of a heavier rainfall, viz: 3.80 on July 26, 1872, and 4.02 on October 4, 1882.

North Carolina.—Marion, McDonough county, 27th: the recent heavy rains caused destructive freshets in the western part of this state. Two large trestles on the Mountain Division of the Western North Carolina railroad were washed away, and the cotton and tobacco crops were badly injured. The damage caused by the storm in western North Carolina is estimated at $200,000.

Ontario.—London: the heavy rain storm on the night of the 9–10th, caused a washout near Dorchester station on the Grand Trunk railroad, eight miles west of this city.

Hillsburg: a severe thunder storm passed over this region during the night of the 21–22d. Considerable damage was caused by washouts on the railroad. At Oxford a hotel was struck by lightning and badly damaged.

Oregon.—Lakeview: on the 9th this place was flooded by a "cloud-burst," which occurred on the mountains about one mile distant. Very heavy rain fell from 7.30 to 8 p. m.; this storm is considered to have been the severest that has occurred in this vicinity for many years.

Pennsylvania.—Harrisburg: a destructive storm, accompanied by a very heavy rainfall, occurred in the Cumberland valley during the evening of the 10th. About one-half mile of the track of the Cumberland Valley railroad east of Newville was washed away. The storm's path was about one-half mile in width and was very destructive to buildings, fences, and grain crops. In this city a severe thunder storm prevailed, during which a number of buildings were struck by lightning and two persons killed.

Curwensville, Clearfield county: a storm of great violence passed over this vicinity during the night of the 10–11th. At 1 a. m., Anderson creek, which divides the town, overflowed and flooded the low grounds. At 8 a. m. of the 11th a large dam, eight miles above the town, gave way and a large quantity of lumber was washed away. A number of small bridges west and north of here were also destroyed. At Bridgeport, one mile from Curwensville, a number of houses and barns were swept away.

Pittsburg: on the 11th the Allegheny valley was visited by one of the heaviest rain storms known for many years. A "cloud-burst" occurred in the vicinity of Brookville, and the creek at that place rose ten feet in less than two hours. The rise was so sudden that no preparation could be made for it, and the dams at several mills gave way, and lumber valued at $75,000 was washed away. At Pittsburg the Allegheny river rose very rapidly, and a number of coal barges were swept from their moorings. Reports from New Martinsville, West Virginia, state that a violent thunder storm prevailed at that place on the night of the 11–12th. A violent thunder storm passed over portions of western Pennsylvania and eastern Ohio on the 24th, causing much damage to property, principally by lightning. At Washington, Pennsylvania, a large planing mill was struck by lightning and burned, entailing a loss of $20,000.

Erie: a severe thunder storm, accompanied by very heavy rain, occurred at 7 p. m. of the 23d. Numerous buildings were struck by lightning during the storm.

Reading: the storm of the 25–26th did great damage to crops throughout Berks county, especially to wheat. At Birdsborough a large part of the Schuylkill canal bank broke during the morning, and flooded many of the adjacent fields.

Lancaster, Lancaster county: the storm on the night of the 25–26th was very destructive in this county. The wheat and tobacco crops were badly damaged, and in some places entirely ruined. Traffic on the Philadelphia and Reading railroad was suspended on account of the washing away of several bridges. Many houses in Lancaster were flooded and much damage sustained.

Rhode Island.—Point Judith: a very heavy rain storm began at 5.50 p. m. of the 25th and continued until 2.35 p. m. of the 26th, during which time 5.29 inches of water fell.

Providence: much damage was done at places north of this city by the storm (low area vi.) of the 25th. At Pawtucket, five miles north, six inches of rain fell, 3.26 inches having fallen at Providence. At Central Falls the storm is reported to have been the most destructive that has occurred for many years. The rainfall was very heavy and flooded the streets and sewers. Reports from Woonsocket also state that the storm at that place was unusually severe.

Tennessee.—Chattanooga: the total rainfall for the twelve hours and thirty-five minutes, ending at 8.40 a. m. of the 7th, was 3.45 inches, which is the heaviest for that length of time that has occurred here since the opening of this station. The streets were flooded and in some places rendered impassable. On the 25th a "cloud-burst" occurred on the opposite side of the Tennessee river north of this city. Stringer's branch, a stream in that vicinity, rose to a greater height than was ever before known, and caused damage by washing away the wheat shocks along its banks.

Texas.—El Paso: on the afternoon of the 18th, a severe thunder storm passed over this station from west-southwest to east-northeast. The wind reached a velocity of thirty-seven miles per hour, causing considerable damage to buildings.

Corsicana: a storm occurred at this place on the 13th which blew the roofs from two houses and prostrated many trees.

Vermont.—Springfield, Windsor county: the heavy rains of the 9th and 10th caused a very destructive freshet at this place. All of the streets were badly washed, and the water flooded many buildings. The damage to business interests in Springfield is estimated at $50,000. All roadways in the surrounding country were rendered impassable from washouts and landslides. The grass crop in many sections was entirely ruined and other crops under cultivation were badly damaged. This is considered the most destructive freshet that has occurred since 1869, and no accurate estimate of the damage caused can be made.

Wisconsin.—La Crosse: on the afternoon of the 21st a severe storm of wind and rain passed over this place; the rainfall amounted to 1.32 inches, nearly all of which fell in about twenty minutes.

Neillsville, Clark county: at 3 p. m of the 24th a severe storm of wind and rain occurred in this vicinity. A dwelling, six miles east, was struck by lightning and burned; one of the occupants was killed.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The Mississippi river was at its highest stage between the 1st and 12th at all stations from Saint Paul, Minnesota, to New Orleans, Louisiana, except at Cairo, Illinois, where it was highest on the 18th; the lowest stages were observed on

the 29th and 30th at all stations, except at Saint Louis and Cairo, where the highest water was noted on the 2d and 4th, respectively. The greatest monthly range in the Mississippi, eleven feet and three inches, occurred at Vicksburg.

The Missouri river reached a point three inches above the danger line at Yankton, Dakota, on the 21st.

The Cumberland river, at Nashville, Tennessee, on the 13th, rose three feet and five inches, giving a depth sufficient for steamboat navigation, which was resumed on that date; the highest stage was attained on the 15th and 16th, when there was a depth of thirteen feet and one inch above low-water mark.

In the following table are shown the danger points at the various river stations; the highest and lowest stages of June, 1884, with the dates of occurrence, and the monthly ranges.

Heights of rivers above low-water mark, June, 1884.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:	Ft. In.		Ft. In.		Ft. In.	Ft. In.
Shreveport, Louisiana	29 9	4	28 3	30	18 7	9 8
Arkansas:						
Little Rock, Arkansas	33 0	6	12 0	25, 26	7 6	4 6
Fort Smith, Arkansas	.....	3	5 0	23	*— 0 7	5 7
Missouri:						
Yankton, Dakota	20 0	21	20 3	1	10 10	9 5
Omaha, Nebraska	16 0	22	14 7	1	9 6	5 1
Leavenworth, Kansas	21 0	24, 25	17 10	1	13 6	4 4
Mississippi:						
Saint Paul, Minnesota	14 6	1	7 3	30	4 2	3 1
La Crosse, Wisconsin	18 0	2, 3	6 10	30	4 6	2 4
Dubuque, Iowa	21 10	4 to 8	9 7	30	7 10	1 9
Davenport, Iowa	15 0	3, 6	7 8	30	5 11	1 9
Keokuk, Iowa	14 6	10	7 11	30	6 6	1 5
Saint Louis, Missouri	30 0	12	21 8	2	16 10	4 10
Cairo, Illinois	40 0	18	26 11	4	20 7	6 4
Memphis, Tennessee	34 0	.....	.....	.....	.....	.....
Vicksburg, Mississippi	41 0	1	41 4	30	30 1	11 3
New Orleans, Louisiana†	—2 6	1, 2	— 1 9	29, 30	— 4 4	2 7
Ohio:						
Pittsburg, Pennsylvania	20 0	12	8 2	8, 9, 10	1 11	6 3
Cincinnati, Ohio	50 0	18	15 4	28	8 0	7 4
Louisville, Kentucky	24 0	20	7 3	30	5 1	2 2
Cumberland:						
Nashville, Tennessee	42 0	15, 16	13 1	5	2 11	10 2
Tennessee:						
Chattanooga, Tennessee	33 0	29	11 5	6	3 5	8 0
Monongahela:						
Pittsburg, Pennsylvania	29 0	12	8 2	8, 9, 10	1 11	6 3
Savannah:						
Augusta, Georgia	.....	26	25 9	4, 5, 6	6 2	19 7
Willamette:						
Portland, Oregon	.....	14, 15	20 2	2, 3	17 11	2 3
Sacramento:						
Red Bluff, California	.....	24	4 5	30	2 7	1 10
Sacramento, California	.....	1	22 0	30	19 4	2 8
Mobile:						
Mobile, Alabama	.....	9	17 4	16, 17, 30	15 0	2 4
Colorado:						
Yuma, Arizona	.....	26, 29	28 4	1	26 2	2 2

* Below bench mark. † Below high-water mark of 1874 and 1883.

FLOODS.

Saint Joseph, Buchanan county, Missouri: on the 23d the Missouri river at Watson, Atchison county, broke through the dyke and flooded what are locally known as the "Sonora Bottoms," causing considerable damage. At Saint Joseph the river continued to rise and large quantities of drift were running.

Lexington, Missouri: the Missouri river rose rapidly at this point on the 23d; the Wabash and Saint Louis railroad tracks in portions of the Ray county bottoms were submerged, causing delay of trains.

Pittsburg, Pennsylvania, 12th: all of the tributaries of the Allegheny are much swollen; the Red Bank creek is reported to have reached the highest point known since 1865, and numerous bridges over that stream were washed away. The Allegheny river rose six feet during the twenty-four hours ending 2 p. m. of the 12th.

Union, Union county, South Carolina: at about 4.30 p. m. of the 25th, a destructive storm occurred; all streams were much swollen by the heavy rains, and crops in the bottom lands were badly damaged.

Chester, Chester county, South Carolina, 29th: the heavy rains of the past week caused great damage to crops. On many of the farms in this county the cotton fields have been ploughed over and prepared for corn. The neighboring streams have been higher than for ten years.

Anderson, Anderson county, South Carolina: a very heavy rainfall occurred on the 26th; several bridges were washed away and great damage was done to the corn crops in the low lands.

Laurens, Laurens county, South Carolina: three bridges and several mill-dams on Robin creek were washed away during the night of the 26–27th; great damage was done to wheat, oats, cotton and corn.

Camden, Kershaw county, South Carolina: the heavy rains preceding the 28th, caused the Wateree river to overflow. In the vicinity of Prosperity, Newberry county, a large amount of damage was done to the growing crops, and several washouts occurred on the Greenville and Columbia railroad.

The Signal Service observer at El Paso, Texas, reports the following:

"The flood in the Rio Grande river has continued throughout June, causing heavy losses to farmers and those engaged in raising stock. The damage to the Atchison, Topeka and Santa Fé, and the Southern Pacific railroads is estimated at $1,000,000. No mails were received at El Paso between May 31st and June 14th; after the last mentioned date the mails and passengers were carried in wagons, around the extensive breaks. The street railway bridge across the Rio Grande at El Paso was washed away on the 9th. From the 25th to the close of the month the river fell steadily—a few inches per day."

Reports from Pena Bianca, Presidio county, Texas, on the the 25th, stated that the water from the Rio Grande river was filling the grand cañons of San Carlos, San Vicente, and Rio Grande to a depth of more than three hundred feet. The water caused great destruction on the Mexican side of the Rio Grande at San Carlos. On the American side, in Presidio and Pecos counties, all of the natural reservoirs and mountain tanks were overflowed. On the tops of the highest mountain ranges the grass is reported to have been green and luxuriant, which is rarely witnessed in that country.

The valleys between El Paso and Fort Quitman were entirely overflowed on the 19th. Reports state that the village of Presidio, Presidio county, was nearly destroyed by the flood.

Yuma, Arizona: on the 9th the Colorado river began to overflow the adjacent low lands; reports from points along the Southern Pacific railroad, west of Yuma, stated that that road was badly washed. The river continued to rise at Yuma, and on the 24th, the river gauge was swept away; on the 28th a height of twenty-eight feet, four inches was attained, which is the highest stage shown by the records of the Signal Service. The observer states that while the river rose to a height fourteen inches above the high stage of March 11, 1884, no damage resulted, which was due to the recent construction of levees. The damage caused by the March flood referred to above was estimated at $250,000.

Salt Lake City, Utah, 30th: the low grounds in the lower part of this city, which were flooded at the close of May, remained under water throughout June. No trains from Denver, via the Denver and Rio Grande railroad, reached this city during the last three weeks of the month on account of floods in southeastern Utah.

Sherlock, Finney county, Kansas: the Arkansas river overflowed its banks in some places on the morning of the 16th.

Under "local storms" will also be found reports of damage caused by the freshets resulting from the heavy rains accompanying storms described under that heading.

HIGH TIDES.

Eastport, Maine, 18th.

Barnegat City, New Jersey: 26th, very high tide, the water in the bay reaching an unprecedented height.

New River Inlet, North Carolina, 22d, 23d.

LOW TIDES.

Eastport, Maine, 9th.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors during June 1884, with the average depth at which the observations were made and the mean temperature of the air at the various stations, are given in the table below. The highest observed water temperatures are: 89°.4 at Indianola, Texas, 88°.4 at Key West, Florida, and 87°.0 at Galveston, Texas; the lowest are: 38°.2 at Marquette, Michigan, 40° at Eastport, Maine, and 40°.3 at Duluth, Minnesota. The greatest monthly ranges are: 23°.5 at Norfolk, Virginia, 22° at Duluth, Minnesota, 20°.4 at Chincoteague, Virginia, and 20°.1 at Cleveland, Ohio; the smallest are: 4°.3 at Savannah, Georgia, 4°.4 at San Francisco, California, and 5°.8 at Wilmington, North Carolina.

Temperature of water for June, 1884.

Station.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
	°	°	°	ft.	in.	°
Atlantic City, New Jersey	72.0	59.4	12.6	4	7	66.4
Alpena, Michigan	71.7	60.0	11.7	12	2	61.5
Augusta, Georgia	80.7	70.6	10.1	11	2	74.2
Baltimore, Maryland	77.0	67.8	9.2	9	9	73.2
Block Island, Rhode Island	63.3	54.1	9.2	8	3	62.3
Boston, Massachusetts	65.6	53.9	11.7	21	1	66.0
Buffalo, New York	72.0	54.4	17.6	9	10	65.5
Canby, Fort, Washington	63.6	52.6	11.0	15	9	55.2
Cedar Keys, Florida	85.6	77.2	8.4	8	11	78.2
Charleston, South Carolina	81.8	74.4	7.4	43	8	75.6
Chicago, Illinois	69.2	52.8	6.4	8	4	65.0
Chincoteague, Virginia	81.0	60.6	20.4	4	3	69.1
Cleveland, Ohio	77.7	57.6	20.1	14	0	68.5
Detroit, Michigan	70.4	55.3	15.1	23	8	70.4
Delaware Breakwater, Delaware	78.7	59.1	19.6	9	4	67.1
Duluth, Minnesota	62.3	40.3	22.0	9	9	57.7
Eastport, Maine	46.1	40.0	6.1	15	5	57.4
Escanaba, Michigan	67.0	49.6	17.4	18	9	62.6
Galveston, Texas	87.0	78.7	8.3	12	6	81.5
Grand Haven, Michigan	80.1	64.5	15.6	19	0	67.9
Indianola, Texas	89.4	79.3	10.1	8	6	80.2
Jacksonville, Florida	84.1	74.3	9.8	18	0	76.9
Key West, Florida	88.4	79.7	8.7	16	9	81.7
Mackinaw City, Michigan	66.6	49.6	17.0	10	0	60.9
Macon, Fort, North Carolina	81.0	66.0	15.0	8	7	73.2
Marquette, Michigan	54.1	38.2	15.9	10	0	59.7
Milwaukee, Wisconsin	62.8	48.3	14.5	8	0	60.3
Mobile, Alabama	82.1	77.4	4.7	16	2	77.8
New Haven, Connecticut	74.7	57.7	17.0	15	8	66.8
New London, Connecticut	62.4	54.0	8.4	12	9	65.1
New York City	68.7	59.5	9.2	16	3	68.7
Norfolk, Virginia	86.0	62.5	23.5	16	10	73.4
Pensacola, Florida	81.3	76.5	4.8	17	7	76.6
Portland, Maine	58.3	48.7	9.6	16	2	66.8
Portland, Oregon	68.1	62.0	6.1	67	6	62.7
Sandusky, Ohio	78.5	61.0	17.5	11	11	69.9
Sandy Hook, New Jersey	71.2	56.3	14.9	1	10	68.4
San Francisco, California	62.5	58.1	4.4	39	1	59.0
Savannah, Georgia	78.3	74.0	4.3	10	2	75.6
Smithville, North Carolina	81.0	71.0	10.0	10	1	74 1
Toledo, Ohio	79.3	63.7	15.6	12	5	70.7
Wilmington, North Carolina	78.3	72.5	5.8	18	7	73.9

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for June, 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 83.44 per cent. The percentages for the four elements are: Weather, 85.97; direction of the wind, 78.39; temperature, 84.75; barometer, 90.90 per cent. By geographical districts, they are: For New England, 80.40; middle Atlantic states, 84.21; south Atlantic states, 84.39; eastern Gulf states, 85.94; western Gulf states, 83.30; lower lake region, 81.76; upper lake region, 82.18; Ohio valley and Tennessee, 85.88; upper Mississippi valley, 85.86; Missouri valley, 80.00; north Pacific coast region, 75.89; middle Pacific coast region, 91.67; south Pacific coast region, 89.17. There were eight omissions to predict out of 3,004, or 0.27 per cent. Of the 2,996 predictions that have been made, forty-nine, or 1.64 per cent., are considered to have entirely failed; one hundred and four, or 3.47 per cent., were one-fourth verified; four hundred and ten, or 13.68 per cent., were one-half verified; six hundred and fifty-seven, or 21.93 per cent., were three-fourths verified; 1,776, or 59.28 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During June, 1884, eighty-nine cautionary signals were ordered. Of these, eighty, or 89.89 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Seven signals were ordered late. No off-shore signals were ordered during the month. In forty-one cases winds of twenty-five miles or more per hour were reported for which no signals were ordered.

Professor T. C. Mendenhall, director of the "Ohio Meteorological Bureau," reports the following:

"The verification of the railway signals during the month was: for temperature, 93 per cent., and for rain, 77 per cent."

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays occurred during June, as follows:

Fort Totten, Dakota: an auroral light was observed in the north at 8.30 p. m. on the 2d, the display consisting of shooting beams reaching an altitude of about 35°; at 11 p. m., a beam, 5° in width, extended across the sky—starting in the east and terminating on the western horizon; this beam was of a very bright color and remained visible until 2.25 a. m. of the 3d.

Saint Vincent, Minnesota: a faint aurora in the form of beams, having an altitude of 45°, was visible from 11 to 11.25 p. m. of the 2d.

Boston, Massachusetts: a faint auroral light of a whitish color, extending to an altitude of 15°, was observed in the northern sky at 11 p. m. of the 2d; the display continued until daylight of the following morning. At 8.30 p. m. of the 3d the aurora was again visible as a faint light, tinged with pink, reaching an altitude of 20°; this display disappeared at midnight.

Westborough, Massachusetts: an aurora was observed at 3 a. m. of the 3d.

Marquette, Michigan: an aurora, consisting of a faint whitish light, was visible from 12.15 a. m. until nearly daylight of the 4th.

Beloit, Wisconsin: an arch of auroral light, over a dark cloud, was observed on the 11th; altitude about 30°.

Fort Buford, Dakota: auroral beams of a pale whitish color were visible in the northeastern sky at 10.35 p. m., of the 13th; the beams apparently rose from a cumulus cloud at an elevation of 20° and extended to a height of 60°. An auroral display was also seen at this station on the 18th—beginning at 9.50 and continuing until 11.10 p. m. It appeared in the form of an arch of reddish color over a dark segment. The arch extended from northeast to northwest, and, at times, streamers rose from it, extending to a height of 65°.

Blooming Grove, Pennsylvania: a diffuse auroral light was observed in the north during the evening of 15th.

Milwaukee, Wisconsin: a display of the auroral light was observed from 9 to 11.45 p. m. of the 16th. The light was most intense in the northeast; in the north and northwest it was only visible in places. The display consisted of a faint glow over a dark segment, with occasional beams or flashes shooting up from the main body of the light.

Portland, Maine: a faint auroral light was seen between 8.30 and 9.30 p. m. of the 16th.

Helena, Montana: a faint aurora was discernible at about 9 p. m. of the 18th; it appeared in the form of a glow in the north where there were two or three beams of light; no traces of the display were visible at 9.20 p. m.

Fort Maginnis, Montana: a faint auroral light of pale bluish color, covering about 20° of the northern horizon, was observed between 9 and 10.20 p. m. of the 18th.

Moorhead, Minnesota: at 10.45 p. m. on the 18th was observed in the north an arc of light, 2° in width, resting on a base of haze; at 11 p. m. the arc broke into streamers, extending toward the zenith; at 11.45 only a dim light remained. A display, exhibiting no marked features, was also observed at this station at 11 p. m. of the 23d.

Escanaba, Michigan: a faint aurora was observed from 9.40 to 11.25 p. m. of the 18th; the light was of a pale yellowish color, and at times, was obscured by cirro-stratus cloud. A similar display also occurred during the night of the 23–24th, beginning at 10 p. m. and lasting until 12.33 a. m.

Cambridge, Massachusetts: an auroral arch was observed at 9 p. m., on the 18th.

Point Judith, Rhode Island: an auroral display, resembling the morning dawn, was seen at 1.30 a. m. of the 19th; it was obscured by fog at 2.15 a. m.

Oswego, New York: a faint auroral light of whitish color was observed in the north from 10 to 11.15 p. m. of the 22d.

Burlington, Vermont: from 2.15 until 2.45 a. m. of the 26th, a bright yellowish, auroral light was observed.

West Washington, District of Columbia: a diffuse auroral light was seen in the northern sky at 9 p. m. of the 26th, lasting an hour.

Syracuse, New York: a faint aurora was observed at 11 p. m. of the 30th.

Auroral displays are reported to have been observed at the following places—no descriptions nor time at which they were observed, being given:

Yutan, Nebraska, 13th, 15th, 20th, 21st, 23d.
Quakertown, Pennsylvania, 15th.
Vevay, Indiana, 17th, 19th.
Swartz Creek, Michigan, 18th, 22d.
Traverse City, Michigan, 22d.
Manchester, Iowa, 24th.

THUNDER-STORMS.

Thunder-storms have been reported in the various districts on the following dates:

New England.—2d, 3d, 5th to 10th, 13th, 19th, 20th, 21st, 23d to 26th.

Middle Atlantic states.—3d, 5th, 6th, 8th to 13th, 19th to 26th, 29th, 30th.

South Atlantic states.—6th to 16th, 19th to 22d, 24th to 30th.

Florida peninsula.—5th to 17th, 19th, 21st to 30th.

Eastern Gulf states.—3d to 10th, 12th to 18th, 20th to 30th.

Western Gulf states.—1st to 5th, 7th, 8th, 9th, 12th to 30th.

Rio Grande valley.—18th, 21st, 23d, 25th, 26th, 27th, 29th.

Tennessee.—2d, 3d, 5th to 14th, 17th to 30th.

Ohio valley.—2d, 3d, 6th to 14th, 17th to 25th, 27th, 30th.

Lower lake region.—1st to 10th, 12th, 13th, 17th to 25th, 30th.

Upper lake region.—1st to 9th, 12th, 16th to 24th, 30th.

Extreme northwest.—3d to 6th, 10th to 15th, 17th, 20th to 30th.

Upper Mississippi valley.—1st to 10th, 12th, 13th, 15th to 25th, 28th, 29th, 30th.

Missouri valley.—1st, 4th to 8th, 11th to 25th, 28th, 29th, 30th.

Northern slope.—1st to 11th, 13th to 16th, 19th to 24th, 26th to 30th.

Middle slope.—1st to 11th, 13th to 30th.

Southern slope.—1st, 2d, 4th to 8th, 11th to 20th, 22d, 26th.

Southern plateau.—1st, 6th, 10th, 13th to 16th, 18th to 21st, 26th to 30th.

Middle plateau.—1st to 4th, 12th, 13th, 15th, 21st, 25th, 27th.

Northern plateau.—2d to 5th, 9th, 11th, 12th, 13th, 18th, 19th, 21st, 22d, 23d, 25th.

North Pacific coast region.—1st, 2d, 4th, 8th, 14th, 18th, 21st, 22d, 23d, 25th, 26th, 28th, 30th.

Middle Pacific coast region.—Fort Gaston and Hydesville, California, 1st; Princeton, California, 1st to 4th; College City, California, 3d and 4th.

South Pacific coast region.—Los Angeles, California, 13th.

ELECTRICAL PHENOMENA.

The observer at Cantonment, Indian Territory, reports that a remarkable phenomenon is often witnessed at the "Red" hills about twenty-eight miles east of that station. The most prominent hill of that group—a ridge several miles in extent, is, during the prevalence of thunder storms, the scene of a wonderful electrical display, the lightning flashing along the entire length of the ridge. It is supposed to be due to this phenomenon that these hills are regarded by the Indians as a "medicine ground," and have long been used by them as a place for their superstitious religious ceremonies.

At West Las Animas, Colorado, between 8 and 9 p. m. of the 16th, the wind-vane was tipped with electric light.

The telegraph line at Fort Assinaboine, Montana, was affected by atmospheric electricity on the 16th.

The observer at Huron, Dakota, reports that at 3 p. m. of the 24th, a vivid flash of sheet lightning spread over the entire sky, the weather being perfectly clear at that time.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various districts on the following dates:

New England.—2d, 6th, 7th, 14th, 22d, 26th, 27th.

Middle Atlantic states.—6th, 7th, 10th, 13th, 14th, 24th, 28th.

South Atlantic states.—3d, 4th, 6th to 9th, 11th, 23d, 25th, 26th, 30th.

Florida peninsula.—4th, 5th, 15th, 16th, 20th.

Eastern Gulf states,—3d, 4th, 8th, 9th, 17th, 22d.

Western Gulf states.—2d, 6th, 7th, 9th, 11th, 13th, 19th, 20th.

Tennessee.—1st, 2d, 4th, 8th, 12th, 13th, 17th.

Ohio valley.—4th, 20th.

Lower lake region.—1st, 3d, 5th, 6th, 11th, 19th, 20th, 22d, 23d, 26th.

Upper lake region.—2d, 3d, 8th, 9th, 18th, 20th, 21st, 22d.

Upper Mississippi valley.—1st, 23d, 24th.

Missouri valley.—1st, 9th, 11th, 15th, 17th, 25th.

Middle slope.—13th.

Southern plateau.—11th.

Middle plateau.—3d, 5th to 10th, 21st.

Northern plateau.—3d, 4th, 5th, 7th.

North Pacific coast region.—6th, 17th, 19th, 21st.

Middle Pacific coast region.—2d, 3d, 6th, 11th, 15th, 17th, 20th, 27th.

South Pacific coast region.—3d.

Dr. J. B. Trembley, of Oakland, California, reports that during the early morning of the 3d the sky was overcast; at 8.30 a. m. it cleared; between 10 a. m. and 1 p. m. was visible one of the most brilliant solar halos that he has observed during a residence of many years at Oakland. The halo gave out, quite distinctly, the prismatic colors of the rainbow, and its brilliancy caused a peculiar shadow or obscurity to the sun's rays, resembling the darkness caused by the solar eclipse. Dr. Trembley states that it is worthy of remark that this brilliant solar halo preceded one of the severest storms (see "local storms") that ever occurred in that region during the month of June.

LUNAR HALOS.

Lunar halos were observed on the following dates in the various districts:

New England.—2d, 3d, 5th, 6th, 7th, 21st.

Middle Atlantic states.—3d to 9th, 30th.

South Atlantic states.—2d, 3d, 5th, 6th, 30th.

Florida peninsula.—5th.

Eastern Gulf states.—1st, 2d, 29th.

Western Gulf states.—4th, 7th, 8th, 9th, 13th, 15th, 19th.

Tennessee.—1st, 2d, 3d, 8th.

Ohio valley.—1st to 8th.

Lower lake region.—1st, 5th, 6th, 9th, 11th, 18th.

Upper lake region.—1st, 3d, 7th, 12th, 15th.

Upper Mississippi valley.—1st, 3d, 6th.

Missouri valley.—2d, 4th, 5th, 8th.
Northern slope.—6th.
Middle slope.—1st, 5th, 7th.
Southern plateau.—1st, 4th.
Middle plateau.—3d, 5th, 7th, 8th.
North Pacific coast region.—4th, 5th, 7th, 8th.
Middle Pacific coast region.—2d, 11th.
South Pacific coast region.—2d.

MIRAGE.

Mr. D. F. G. Crawford, of Allegheny City, Pennsylvania, reports that, on June 11th, the flames from the McGuigan natural-gas well, sixteen miles distant, were distinctly visible in two places. Between the natural-gas well and Allegheny City, intervenes a hill, at least two hundred and fifty feet in height, and ordinarily only a faint glow from the flame is observed. A similar phenomenon was observed at this place, March 16th, 1884.

Fort Macon, North Carolina: at 8.45 a. m. of the 13th the image of a group of trees north of this station appeared to be elevated 15° above the horizon.

Point Judith, Rhode Island: from 5.30 p. m. until after sunset on the 16th, Block Island, with its inverted image above it, appeared several miles nearer than its actual distance from this place. The smoke from the steamers on the sound settled in a narrow band parallel to the horizon and at the same altitude as the inverted image of the island. Vessels to the southwestward appeared twice their actual height—the topmasts meeting the band of smoke above mentioned.

New London, Connecticut: from 6.30 to 7.20 p. m. of the 23d, the images of several vessels beyond the horizon were observed (not inverted) at an altitude of 15°.

Mirage was also observed at the following places:
Indianola, Texas, 4th, 6th.
Galveston, Texas, 5th.
Salina, Kansas, 14th, 25th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service stations. Reports from one hundred and sixty stations show 4,765 observations to have been made, of which two were reported doubtful; of the remainder, 4,763, there were 3,936, or 82.6 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for June, 1884:

Date—June, 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 6 p. m.	0	0	0	10‡	0	0	8	30‡	
2, 12 m.	1	15‡	0	0	1	15‡	9	50‡	
4, 10 a. m.	0	0	5	20‡	0	0	4	30‡	
5, 9 a. m.	1	3	0	0	1	3	5	35‡	
6, 10 a. m.	0	0	0	0	0	0	5	35‡	
7, 1 p. m.	0	0	0	0	0	0	5	40‡	
8, 4 p. m.	1	10‡	0	0	0	0	6	50‡	
9, 3 p. m.	1	1	0	0	1	1	7	30‡	
13, 11 a. m.	4	10‡	.....	.....	.....	.....	8	15‡	
14, 11 a. m.	1	1	0	0	1	1	7	10‡	
15, 11 a. m.	0	0	0	0	0	0	5	7	
16, 4 p. m.	1	5‡	1	1	1	1	6	12‡	
17, 5 p. m.	1	2	0	0	1	2	7	14‡	
18, 6 p. m.	0	0	0	0	0	0	5	15‡	
20, 2 p. m.	1	5‡	.....	.....	.....	.....	6	20‡	
21, 4 p. m.	0	5	0	0	0	0	6	25‡	
22, 5 p. m.	0	0	0	0	0	0	5	20‡	
23, 12 m.	1	1	0	0	1	1	6	20‡	
24, 3 p. m.	0	0	1	2	0	0	4	10	
26, 4 p. m.	2	7	.....	.....	2	7	4	15	
27, 5 p. m.	2	3	0	2	2	3	7	15‡	
28, 6 p. m.	0	0	1	5	0	0	5	12‡	
29, 5 p. m.	0	10‡	0	0	0	0	5	25‡	
30, 4 p. m.	0	15‡	0	0	0	0	5	40‡	Faculæ abundant.

Faculæ were seen at the time of every observation. ‡Approximated.

Mr. William Dawson, of Spiceland, Henry county, Indiana, furnishes the following record of sun spots for June, 1884:

Date.	Hour of observation.	Number of groups.	Number of spots.	Remarks.
1st	9.15 a. m.	5	53	Observations made with telescope of 4.6 inches aperture; power 100; reflecting prisms; full aperture used.
2d	8.20 a. m.	5	60	
4th	8.15 a. m.	5	40	
5th	8.15 a. m.	6	60	
7th	4.20 p. m.	5	37	
13th	7.40 a. m.	3	12	
15th	9.45 a. m.	3	6	
17th	8.40 a. m.	6	21	
18th	8.40 a. m.	6	45	
19th	8.00 a. m.	5	25	
21st	8.00 a. m.	5	47	
22d	8.00 a. m.	5	47	
23d	8.20 a. m.	4	36	
27th	9.00 a. m.	5	20	
28th	8.00 a. m.	5	23	
30th	8.15 a. m.	5	40	

DROUGHT.

Arkansas.—Lead Hill, Boone county: although the rainfall for June at this place was 3.60 inches, the rains were remarkably local, and in surrounding localities drought prevailed.

Connecticut.—Hartford: no rain fell during the first eleven days of the month; on the 12th and 13th two very light showers fell; after these dates there was no rain until the storm of the 25th and 26th, which was accompanied by heavy rain. During the first and second decades of the month the drought was very severe and caused great damage to vegetation, especially to the hay crop.

New Haven, 24th: rain is seriously needed in the farming districts of this state. It is reported that the condition of the grass crop indicates that the yield will be the lightest for many years past. The apple crop is also seriously affected, the trees being injured by canker worms. The drought was terminated by the heavy rains of the 25th and 26th.

Michigan.—Port Huron, 8th: the weather is very warm and dry, and vegetation is badly parched; rain is much needed in this section.

New York.—Westchester, Westchester county, 22d: the farmers in this vicinity state that all crops, especially potatoes and corn, are suffering for rain.

North Carolina.—Scott's Hill, Pender county: reports from the surrounding country on the 19th and 20th stated that crops were suffering in consequence of drought. A much needed and abundant rainfall occurred on the 27th.

Pennsylvania.—Erie: the heavy rains of the 10th were of great benefit to the grass crop in this region which, before the above date, was suffering from drought.

Texas.—Rio Grande City, 24th: the soil is very dry and hard and all vegetation is much burned by the extremely hot and dry weather; there is also an insufficient supply of water for stock.

Virginia.—Johnsontown, Northampton county: from May 20th to June 24th, the total rainfall was only 0.15 inch; as a result, one of the severest droughts prevailed that has ever been experienced in this country.

METEORS.

Fort Gaston, California: a brilliant meteor, apparently of about 30′ diameter, was observed in the north-northwestern sky at 8.15 p. m. of the 1st. The whole sky was illuminated as if by a flash of lightning; there were two visible explosions.

Lynchburg, Virginia: at 9.04 p. m. of the 23d a very large meteor was observed moving rapidly northward; it exploded when about 10° above the horizon. During its flight a whizzing noise was heard but no report was heard at its explosion. At about the same hour a meteor (probably the same) of this description was observed at Staunton, Virginia.

The following reports probably refer to the same meteor:

Variety Mills, Nelson county, Virginia: a brilliant meteor was observed at about 9.10 p. m. on the 23d. It started in the southwestern sky about midway between the horizon and zenith,

moved northwestward, and disappeared when about 20° above the northern horizon. Its colors were blue, red, and green, and throughout its course it emitted bright sparks. Before disappearing it exploded, but no noise was heard.

Cape Henry, Virginia: a large meteor of greenish tinge was observed at 9.30 p. m of the 23d.

Meteors were also observed at the following places:
Indianola, Texas, 24th.
Burlington, Iowa, 18th.
Prescott, Arizona, 22d.
Archer, Florida, 9th, 12th.
Vevay, Indiana, 16th, 21st, 22d.
Liberty Hill, Arkansas, 12th, 20th, 24th.
Woodstock, Maryland, 15th, 16th.
Tecumseh, Nebraska, 2d.
Menand Station (near Albany), New York, 29th.
Chapel Hill, North Carolina, 23d.
Clarksville, Texas, 30th.
Woodstock, Vermont, 17th.
Madison, Wisconsin, 29th.
Yutan, Nebraska, 25th.

EARTHQUAKES.

Red Bluff, California: two light shocks of earthquake were felt at 1 a. m. of the 6th; they were each of about one second's duration and separated by an interval of three or four seconds. The shock caused the wall of a two-story brick building to crack; the direction of the vibration was from east to west.

Los Angeles, California: an earthquake shock was felt at 10.48 a. m. of the 16th; the vibrations were from north to south, and were of about two second's duration.

Captain C. F. Swan, commanding the ship "City of Brooklyn," at San Francisco, California, June 14th, reports that at 8.43 a. m. of the 12th, in N. 40° 24′, W. 125° 50′, experienced a heavy shock, supposed to have been that of an earthquake, which caused the vessel to shake as though she had struck a reef.

WATER SPOUTS.

Key West, Florida: soon after 5 p. m. of the 12th three water spouts were observed near the light house, seven miles northwest of this island. Other spouts formed rapidly until nine were visible at one time. They remained in sight for nearly twenty minutes, meanwhile moving rapidly southward for a distance of about four miles, and then returned and were dissipated at or near the point where they were first seen, describing in their course a parabolic curve. Eight of the water spouts were perfectly formed and one was only partially formed; one was very large, its diameter being estimated at thirty feet. They did not approach sufficiently near to this station to be heard.

POLAR BANDS.

Lead Hill, Arkansas, 2d, 10th, 12th, 28th.
Los Angeles, California, 24th, 29th.
Archer, Florida, 3d, 11th, 15th, 20th, 26th, 30th.
Fort Reno, Indian Territory, 4th.
Salina, Kansas, 13th, 19th, 24th, 28th.
Gardiner, Maine, 15th, 16th.
Somerset, Massachusetts, 13th, 14th.
Yutan, Nebraska, 10th, 17th, 21st.
Mountainville, New York, 7th, 14th, 26th.
Leetsdale and Pittsburg, Pennsylvania, 26th.
Providence, Rhode Island, 13th, 15th.
Stateburg, South Carolina, 22d.
Nashville, Tennessee, 1st, 2d.
Rio Grande City, Texas, 8th, 12th.
Woodstock, Vermont, 19th, 21st.
Wytheville, Virginia, 4th.

INSECTS.

Red Bluff, California: on the 20th it was reported that grasshoppers were appearing in large numbers and were causing considerable damage west of this station.

Salt Lake City, Utah, 30th: during the month swarms of a species of caterpillar made their appearance and caused considerable damage to the orchards in this vicinity and in the settlements lying north and south. At the close of the month they had not entirely disappeared.

ZODIACAL LIGHT.

Los Angeles, California, 23d, 25th.
Pensacola, Florida, 12th.
Indianapolis, Indiana, 18th.
Manchester, Iowa, 11th, 12th, 14th.
Monticello, Iowa, 29th.
Elk Falls, Kansas, 14th.
Fall River, Massachusetts, 16th, 18th.
Nashville, Tennessee, 18th 20th, 21st.

PRAIRIE AND FOREST FIRES.

Fort Buford, Dakota, 9th, 10th.
Manistique, Michigan, 27th, 28th.
Fort Benton, Montana, 17th, 18th.
Portland, Oregon, 24th.
Indianola, Texas, 2d.
Cape Henry, Virginia, 4th.

SAND STORMS.

Fort McDowell, Arizona, 3d.
Fort Reno, Indian Territory, 4th.
Yuma, Arizona, 22d.

NOTES AND EXTRACTS.

REPORT OF THE ALABAMA WEATHER SERVICE, UNDER DIRECTION OF PROFESSOR P. H. SNELL, JR.

AGRICULTRAL AND MECHANICAL COLLEGE,
AUBURN, ALABAMA, *July* 1, 1884.

The dry weather of May has been followed in June by an almost constant precipitation. The first three days of the month were dry over the whole state, but from the 4th to the 16th, inclusive, the rainfall was almost continuous. The 17th, 18th, 19th, 20th, and 21st, were bright days, with but little rain at any point in the state. The remainder of the month was cloudy and showery. The farmers were able during May to clean their crops and put them in order for the rains that usually follow in June, but the rains have been so general during the past thirty days that the grass has regained its foothold and much work will be required to eradicate it and place the crops again in a favorable condition.

The first three days of June were cool, rendering fires comfortable, and the rays of the sun not unpleasant. The sky was generally clear, but the prevailing direction of the wind was from the east and southeast. On the 4th, the temperature began to rise and the winds became variable. Upon the 9th another cool wave passed over the state with winds from the northeast and northwest, and frequent occurrence of violent electrical storms from the west and northwest. Thick clothing and fires were again in demand. On the 17th, the temperature again increased with the wind from the east and southeast. The 21st and 22d, were the warmest days of the month. From this time until the close of the month, the thermometer gave high readings, with winds more or less variable.

State Summary.

Mean temperature 74°.6; highest temperature, 100° at Calera, on the 21st; lowest temperature, 45° at Selma, on the 1st; monthly range of temperature for the state, 55°; greatest monthly ranges at stations, 40° at Gadsden, and 52° at Calera; least monthly ranges at stations, 20° at Tuscaloosa, and 31° at Auburn; greatest daily ranges of temperature, 45° at Calera, 39° at Selma, and 32° at Gadsden, all on the 1st; least daily ranges of temperature, 0° at Dadeville on the 10th (the thermometer standing at 72° all day), 1° at Tuscaloosa on the 10th, 1° at Clanton on the 3d, 1° at Marion and Greensborough on the 15th, 4° at Pineapple on the 22d, 4° at Green Springs on the 4th and 30th.

Mean depth of rainfall, 7.25 inches; mean daily rainfall, 0.26 inch; greatest monthly rainfalls: 15.65 inches at Clintonville, 12.94 inches at Clanton, 11.52 inches at Auburn; least monthly rainfalls: 3.15 inches at Evergreen, and 3.96 inches at Florence; greatest daily rainfall, average for the state, 0.97 inch on the 30th; heaviest daily rainfalls: 5.07 inches at Clintonville on the 16th, 4.00 inches at Auburn on the 28th, 3.62 inches at Montgomery on the 30th; Dadeville reports 1.75 inches in twenty-two minutes on the 30th; days of general rainfall, from the 4th to 16th, and from the 22d to 30th.

Average number of days on which rain fell, 15; average number of cloudy days, 16; fair days, 10; clear days, 4.

Warmest days, 21st and 22d; coldest days, 1st and 11th.

Prevailing direction of the wind, east and southeast; greatest force of wind reported from Florence on the 9th—40 miles per hour from the southwest; all stations reported heavy winds on the 9th; Montgomery reports, on the 13th, 28 miles per hour from the north.

REPORT OF THE TENNESSEE WEATHER SERVICE, JUNE, 1884.

The meteorological features of the past month were very similar in many respects to those of the corresponding period of last year, particularly in the amount of rainfall and the frequency of thunder storms, but these latter were notably devoid of high winds which are the usual accompaniments of June storms, only a few instances being recorded of the prevalence of winds of any particular force or violence.

The mean temperature for the month was 72°, which is 5°.6 above that for the preceding month, and 1° below that for the corresponding month of last year. This mean is perhaps two or three degrees below the normal for June. The mean of the maximum temperatures was 91°.4, or 2°.6 above that of June, 1883, and the mean of the minimum was 56°.5, or 0°.7 below that for June, 1883. The highest temperature was general on the 21st and 22d, and the lowest about the 1st and 10th.

The average rainfall for the month was 5.30 inches, which is 1.72 inches greater than the average for May, and 0.33 inch greater than for June, 1883. The days of the greatest rainfall were the 6th, 9th, 10th, 12th, 14th, 15th, and 29th. The greatest local daily rainfall was on the 5th at Henderson, and amounted to 2.76 inches in twenty-four hours. The rainfall of the 7th was heavy throughout the eastern division, but was confined almost exclusively to that part of the state, there being only one station each in the middle and western divisions reporting any rainfall on that day, and that being very slight. From the 2d to the 6th, inclusive, the rainfall was very heavy in the western division. From the 16th to 25th very little rain fell throughout the state, three of the days, viz: 18th, 19th, and 21st being reported entirely free from it.

During the early part of the month the weather was very unfavorable to farming operations. The excessive rains which followed closely on the cool, dry weather of May greatly delayed farmers in the work of cleaning out their young and growing crops, and caused an unusual amount of exertion to prepare them for the proper attention to the season of harvest. As a result, the close of harvest found many farmers very much "in the grass." During the latter part of the month, however, the season was more favorable, and the young crops, yielding to the influence of a genial sun and sufficient moisture, improved with wonderful rapidity, and although for the most part being two weeks late, at the close of the reports they show conditions which are perhaps equal to the average, and the prospects over the state are favorable for good yields.

State Summary.

Mean temperature, 72°; highest temperature, 95° on the 22d at Paris, and on the 25th at Hohenwald; lowest temperature, 47° on the 1st at Andersonville; monthly range of temperature, 48°; least daily range of temperature, 0° on the 6th at Ashwood, and on the 14th at Greenville, and 1° on the 3d at Howell, on the 10th at Dyersburg, and on the 11th at Manchester.

Mean depth of rainfall, 5.30 inches; mean daily rainfall, .177 inch; greatest monthly rainfall, 10.57 inches at Grief; least monthly rainfall, 2.06 inches at Covington.

Average number of clear days, 7.3; fair days, 8.7; cloudy days, 1.4; average number of days on which rain fell, 13.3.

Prevailing winds, south and east.

REPORT OF THE MISSOURI WEATHER SERVICE, JUNE, 1884.

The mean temperature during the past month has been, at the central station, 1°.1 below the normal for Saint Louis.

The maximum temperatures were observed all over the state in the early part of the third decade of the month—generally on the 22d and 23d of the month.

The lower minima were observed on the 9th and 10th of the month. This low temperature was generally preceded at almost all stations by a severe storm from the northwest.

The rainfall at the central station was considerably below the normal for Saint Louis, which is 5.48 inches.

Hail was observed along with the storm on the 7th and 8th, at Chamois, Miami, Glasgow and Saint Louis.

The past month has been remarkable for the number of thunder storms and, in some localities, an almost constant display of lightning.

The wheat crop is reported as being generally good, and the prospects for corn are good almost all over the state. The prospects for fruit are generally good except in the northwestern part of the state, where the cold rains of the 1st of May seem to have blighted it.

A. RAMEL,
Assistant in Charge.

Washington University, *July* 10, 1884.

WEATHER REPORT FOR JUNE, 1884.

Prepared by Prof. F. H. Snow, of University of Kansas, from observations taken at Lawrence.

The weather of this month was characterized by its low mean temperature; high mean barometer, very light wind velocity, clear skies, high humidity, and rainfall, ample, though somewhat below the June average. There were only two "hot" days during the month—days on which the temperature exceeded 90°, and only three of the sixteen preceding Junes have been cooler than this. The rainfall was remarkably well distributed and the staple crops were never in more luxuriant condition than at the close of the month

Mean temperature—71°.07, which is 2°.90 below the June average. The highest temperature was 92° on the 25th and 30th, the lowest was 48° on the 10th, giving a monthly range of 44°. The mercury reached 90° only twice. Mean temperature at 7 a. m. 66°.80, at 2 p. m. 80°.58, at 9 p. m. 68°.45.

Rainfall—3.81 inches, which is 1.30 inches beolw the June average for the sixteen preceding years. Rain fell on twelve days. There were seven thunder showers. The entire rainfall for the six months of 1884, now completed, has been 18.14 inches, which is 1.04 inches above the average for the same months in the preceding sixteen years.

Mean cloudiness—38.78 per cent. of the sky, the month being 3.16 per cent. clearer than usual. Number of clear days (less than one-third cloudy) 17, half clear (from one to two-thirds cloudy) 8, cloudy (more than two-thirds) 5. There were two entirely clear days and not one entirely cloudy day. Mean cloudiness at 7 a. m. 47 per cent, at 2 p. m. 43.67 per cent, at 9 p. m. 24.67 per cent.

Wind—sw. 23 times, se. 22 times, nw. 17 times ne. 15 times, e. 7 times, n. 3 times, s. 2 times, w. 1 time. The total run of the wind was 6806 miles, which is 3929 miles below the June average, and is the smallest monthly run upon our entire record. This gives a mean daily velocity of 226.87 miles, and a mean hourly velocity of 9.45 miles. The highest velocity was 75 miles an hour on the 22d, from 4 to 4.20 p. m. This high wind was entirely straight and did no damage worthy of mention.

Barometer—mean for the month 29.065; at 7 a. m. 29.087, at 2 p. m. 29.051 inches, at 9 p. m. 29.058 inches; maximum 29.270 on the 28th; minimum, 28.831 inches on the 8th; monthly range, 0.439 inch.

Relative Humidity—mean for the month, 71.8; at 8 a. m. 72.7, at 2 p. m. 54.4, at 9 p. m. 78.5; greatest, 97 on the 9th, least, 40 on the 30th. There was one fog.

The following table furnishes a comparison with the sixteen preceding Junes:

June.	Mean temperature.	Maximum temperature.	Minimum temperature.	Hot days.	Rainy days.	Rain (inches).	Thunder-storms.	Mean cloudiness.	Humidity.	Number of fogs.	Miles of wind.	Mean barometer.	Maximum barometer.	Minimum barometer.
	°	°	°											
1868	75.05	99.0	57.0	11	6	3.80	3	41.71	.....	0	.....	.....	.....	.....
1869	69.86	90.0	37.0	1	15	7.57	10	56.74	77.0	1	.....	29.075	29.355	28.738
1870	73.71	102.0	44.0	12	13	1.88	6	39.44	68.0	1	.....	29.082	29.275	28.829
1871	76.85	96.0	53.0	12	10	4.06	5	46.33	66.9	0	.....	29.038	29.197	28.857
1872	76.98	97.0	53.0	14	14	1.30	6	35.33	61.4	0	.....	29.040	29.426	28.633
1873	76.90	97.0	58.0	9	11	2.96	3	41.66	68.0	0	9,445	29.033	29.234	28.770
1874	77.11	95.0	53.5	9	7	3.58	3	34.70	66.0	0	10,241	29.027	29.246	28.718
1875	75.47	99.0	49.0	13	7	3.45	3	31.44	60.2	0	12,887	29.028	29.336	28.598
1876	70.24	98.0	50.0	8	11	12.11	4	58.60	68.6	0	12,371	29.010	29.251	28.733
1877	72.03	95.0	47.0	4	14	7.20	9	38.78	75.3	0	8,741	29.011	29.201	28.683
1878	69.79	89.0	50.0	0	10	5.67	6	48.66	74.8	0	9,187	29.032	29.294	28.787
1879	73.22	97.0	45.0	12	10	7.14	9	41.33	69.9	0	9,498	29.040	29.417	28.675
1880	73.57	96.0	50.5	8	9	4.10	5	37.44	68.1	0	12,629	29.041	29.351	28.538
1881	77.25	97.0	62.5	14	13	4.52	10	31.89	70.1	0	11,474	28.969	29.186	28.707
1882	74.14	99.0	44.5	11	11	4.72	5	38.99	69.9	0	10,874	28.992	29.358	28.607
1883	71.38	94.0	48.5	6	14	7.73	7	38.56	74.3	0	10,737	29.028	29.217	28.671
1884	71.07	92.0	48.0	2	12	3.81	7	38.78	71.8	1	6,806	29.065	29.270	28.831
Mean	73.80	96.0	50.1	9	11	5.04	6	41.79	69.4	0	10,407	29.032	29.288	28.711

The following is taken from the June report of the Illinois Department of Agriculture, Mr. S. D. Fisher, Secretary:

Division of state.	Temperature.			Precipitation (inches).	Number of days on which rain fell.
	Mean of max.	Mean of min.	Monthly mean.		
	°	°			
Northern	90.8	45.6	68.8	3.83	7
Central	91.9	51.6	71.1	5.60	13
Southern	94.0	53.9	73.4	5.71	10
Average for state	92.3	51.4	71.1	5.04	10

LOUISIANA STATE WEATHER SERVICE.—REPORT FOR JUNE, 1884.

Thunder storms were general throughout the state on the 4th, 5th and 6th, and from the 22d to the 30th inclusive. Lunar halos: New Orleans, 2d; Red river, 29th.

The temperature shows a gradual increase in height of thermometer with but one cool period, the 11th and 12th, and reached a climax on the 28th in 102° at Minden. The extremes centered at Alexandria. The temperature at New Orleans was 1°.5 below the average for June during thirteen years.

During the month the Red river fell 9 feet 8 inches at Shreveport; the Ouachita, 7 feet 7 inches at Monroe. The Red river, while flooding its valley from Shreveport to below Loggy Bayou, was not out of its banks from Coushatta to a point below Grand Ecore, by from five to six feet. At Alexandria it reached the water mark of 1866, while below there, forty miles, it reached the mark of 1849, which at Alexandria is said to have been two and one-half feet above 1866. Loggy Bayou has deepened considerably, greatly improving navigation. These facts are interesting.

Crops are generally fifteen days late. Cotton, where it has been well

worked, is improving rapidly. Plant cane is greatly improved, but stubble is generally reported as only half a stand and small.

Mean temperature, 78°.5; highest temperature, 102°, at Minden, 25th and 26th; lowest temperature, 53°, at Alexandria, 11th and 12th; monthly range, 49°; greatest daily range, 38°, at Alexandria, 25th and 30th; least daily range, 6°, at Alexandria, 3d.

Greatest rainfall, 2.78 inches, at Alexandria, 28th; greatest rainfall for month, 9.26 inches, at Alexandria; average rainfall for state, 4.49 inches.

ROBERT S. DAY, *Secretary.*

REPORT OF THE OHIO METEOROLOGICAL BUREAU, JUNE, 1884, UNDER THE DIRECTION OF PROF. T. C. MENDENHALL.

The mean atmospheric pressure was somewhat less than for June, 1883. The maximum was almost exactly the same, and the range was .13 inch less.

The mean temperature was 71°.1, against 69°.0 for the same month of last year. The highest temperature was reported at Washington C. H., the maximum reading for the 23d being 98°.7. This is 6°.5 higher than the maximum for June of last year. The minimum was 40°.0, recorded on the 10th at Sidney, and is 5°.5 higher than the minimum of the corresponding month of 1883.

The mean rainfall was 2.96 inches, against 4.25 inches for the correspondmonth of last year.

A self-registering anemometer has been placed in the central office at the Ohio State University, and continuous readings have been made during the past months. The total movement of the wind recorded, is 5,940 miles, while at the United Signal station in the city, three miles away, it was only 3,739 The instrument of the University thus shows a movement fifty-nine per cent. greater than that in the city. At the latter station the prevailing direction of the wind is reported as southeast from the five daily observations, and northeast from the three telegraphic observations. At the University the prevailing direction was southeast.

A number of somewhat violent storms occurred during the month, particularly in the northern and northeastern parts of the state. We are indebted to the observers in Canton, Cleveland, and Warren, for accounts of the storms, most of which occurred about the 23d, 24th, 25th, and 26th of the month. The most violent as well as the greatest in area occurred on the night of the 23d. Considerable damage was done at Youngstown, Chardon, Jefferson, Wellington, and in the vicinity of these towns. The storm passed into Pennsylvania without much abatement of its fury, and brief reports are at hand from Erie and Corry, in that state. Throughout its course it was accompanied by brilliant, and in some instances, disastrous displays of atmospheric electricity.

A so-called "water-spout" occurred in the vicinity of Canton, Stark county, on the afternoon of the 24th, of which some exaggerated accounts appeared in the newspapers. Mr. Stokey, our observer at that place, investigated the storm as soon as possible after its occurrence, and reports substantially as follows: "the centre of the storm was near the southwest corner of Canton township. At a little after noon, June 24th, persons in that neighborhood observed a moderate thunder-storm, apparently two or three miles east. It seemed not to change its position or character for more than an hour. A little after one o'clock a heavy black thunder-cloud was observed in the northwest, extending almost to the zenith, from the lower, or northwestern edge of which rain seemed to be falling. It hung apparently motionless for about thirty minutes, but probably moved slowly eastward. Another, less dense, was observed forming in the southwest. In the meantime the eastern storm had slowly moved westward. A little before two o'clock, with unexpected suddenness, the storm-clouds from the east and northwest met in the zenith. Then for thirty minutes the rain came down in torrents; the wind became violent and blew from very different directions in rapid succession. There was no hail and not very much thunder. After a short lull, the southwest cloud joined the others. Then for fifty minutes the water came down, not in drops, but in sheets, edgewise, at an angle of about 45°, with spaces from two to eight inches between them. As before, the wind was changeable and violent, and the thunder not very remarkable. During this part of the storm, however, considerable hail fell, the stones being in size like peas and hazel nuts." No one measured the rainfall in these eighty minutes. The estimates of the most careful witnesses vary from twelve to twenty inches. From an examination of a basin of about forty acres, Mr. Stokey was of the opinion that the lower limit was about right. The storm, or the violent portion of it, did not cover more than two square miles.

State summary.

Mean barometer, 30.037 inches; highest barometer, 30.376 inches, on the 18th at Sandusky; lowest barometer, 29.624 inches, on the 9th at Quaker City; range of barometer, 0.752 inch.

Mean relative humidity, 74.7 per cent.

Mean temperature, 71°.1; highest temperature, 98°.7, on the 23d at Washington C. H.; lowest temperature, 40°, on the 10th at Sidney; range of temperature, 58°.7; mean daily range of temperature, 22°.7; greatest daily range of temperature, 41°, on the 2d at Sidney; least daily range of temperature, 5°, on the 25th and 10th at College Hill and Junction, respectively.

Average number clear days, 12.6; fair days, 10.8; cloudy days, 6.6; number of days on which rain fell, 9.2.

Mean rainfall, 2.96 inches; average daily rainfall, 0.099 inch; greatest monthly rainfall, 6.61 inches, at Logan; least monthly rainfall, 1.11, at Ohio State University.

Prevailing direction of wind, northeast.

MISSISSIPPI WEATHER SERVICE BULLETIN FOR JUNE, 1884.

The month as a whole was cool and damp. The average June temperature over the whole state for a period of many years has been 79°.5. For the month just past it was 77°.5 in the central part, and 74°4 in the northern part of the state. There was a sudden fall of temperature at all the stations on the 11th, making the means for that day about 10° lower than for the day before. A gradual rise of temperature continued from the 11th to the 22d, culminating in a mean of 83°.7 for the whole state on the latter date. The daily means were everywhere above 75° from the 18th to the end of the month.

The average rainfall over the whole state for many years has been 4.5 inches for June, and in the last month it was 5.07 inches. The heaviest daily rainfalls were 2.02 inches in Jackson, on the 3d; 2.15 inches at Corinth, on the 4th; 1.11 inches on the 5th, and 2.10 inches on the 6th: and 2.17 inches in Holly Springs, on the 29th.

The following tabulated statement is taken from the daily reports received from the stations named:

Stations.	Highest temperature.	Dates.	Lowest temperature.	Dates.	Highest daily mean.	Dates.	Lowest daily mean.	Dates.	Greatest daily range.	Dates.	Least daily ranges.	Dates.	No. of days when rain fell.	Rainfall (inches).
	°		°		°		°		°		°			
Vicksburg	97	22	62	11	84	24	69	2, 3 11	24.7	21	7	3	10	3.14
Edwards	95	20, 22 25	62	11	84.5	25	67	11	27	20	11	11	9	4.15
Jackson	97	25	60	11	84	22	73	4, 11	30	19	15	3, 4	5	2.59
Lake	95	24, 25	58	11	83.5	21	60	11	31	19	14	4, 5	10	1.94
Grenada	96	22	59	11	83.5	25	64.5	11	29	23, 24	11	11	11	4.11
Batesville	97	21, 22	60	11, 12	83.5	22, 25	64.5	11	30	21	9	11	12	5.12
Oxford	96	21	56	11	81.5	21, 22	61	11	29	20, 21	8	5	9	6.21
Holly Springs	94	22	56	11	84.5	22	60.5	11	22	21, 22 23	6	5	12	8.07
Hernando	100	20, 25	56	11	85	25	63	11	33	20	11	11	12	5.60
Lamar	92	19, 20 21	62	11	85	22	70	2, 11	18	19, 20	2	2, 5	13	5 x
Corinth	96	22	57	11	83	22, 24	63	11	34	20	5	4	7	5.08
Grand Junct'n, Tenn	95	21, 22	55	11	83.5	22	60	11	23	19, 20 21	7	5	13	6.76
Memphis, Tenn	96	22	59	11	86.25	22	64	11	20	18, 20 21, 24	10	11, 29	10	7.17

It is hoped that the next monthly bulletin will include reports from at least a dozen new stations, and that arrangements can be made for a fuller publication of results than the above.

R. B. FULTON,
Director.

University of Mississippi, *July* 7, 1884.

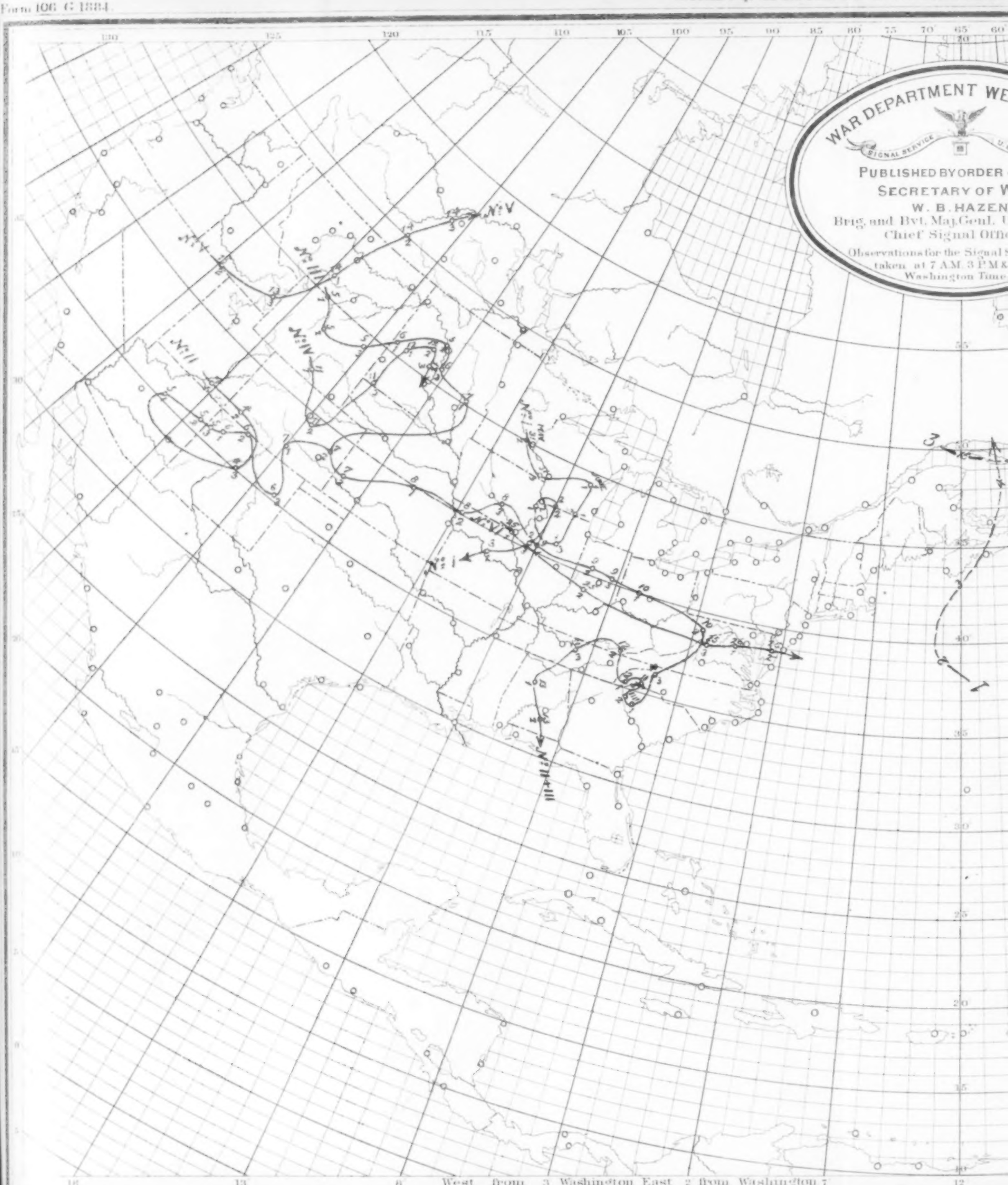
ERRATA.

On page 120, May REVIEW, under the heading "deviations from mean temperature," at Mattoon, Coles county, Illinois, mean temperature, 66°.0, should read 62°.5.

On page 99, April REVIEW, under "deviations from mean temperature," Webster, Day county, Dakota, mean temperature 29°.8, should read 38°.3.

Form 106 C 1884.

Chart I. Tracks of Low-Barome


WAR DEPARTMENT WE
SIGNAL SERVICE
PUBLISHED BY ORDER
SECRETARY OF W
W. B. HAZEN
Brig. and Bvt. Maj. Genl. U
Chief Signal Offic
Observations for the Signal S
taken at 7 A.M. 3 P.M &
Washington Time.
West from 3 Washington East 2 from Washington 7

Barometer Areas, June, 1884.

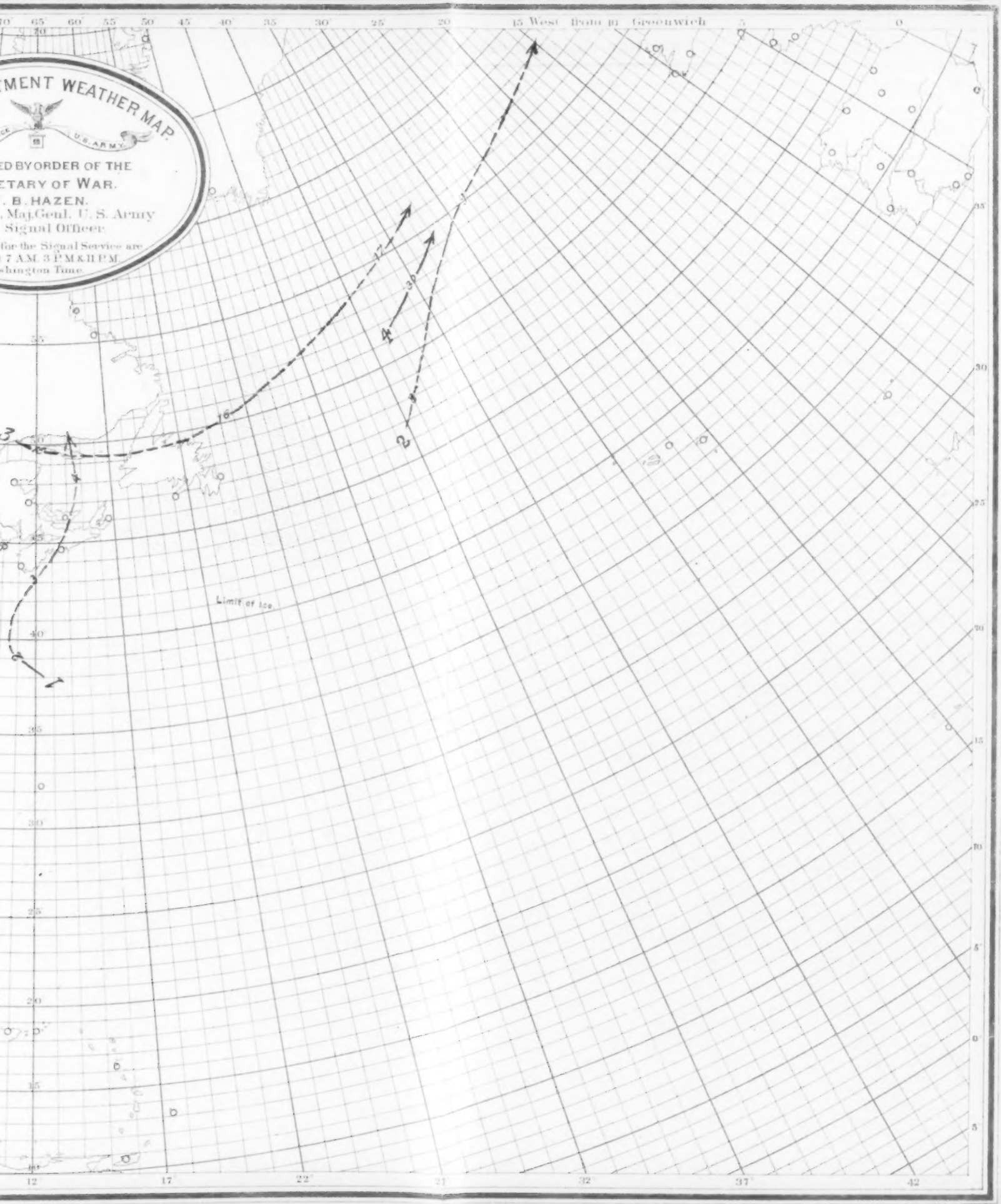
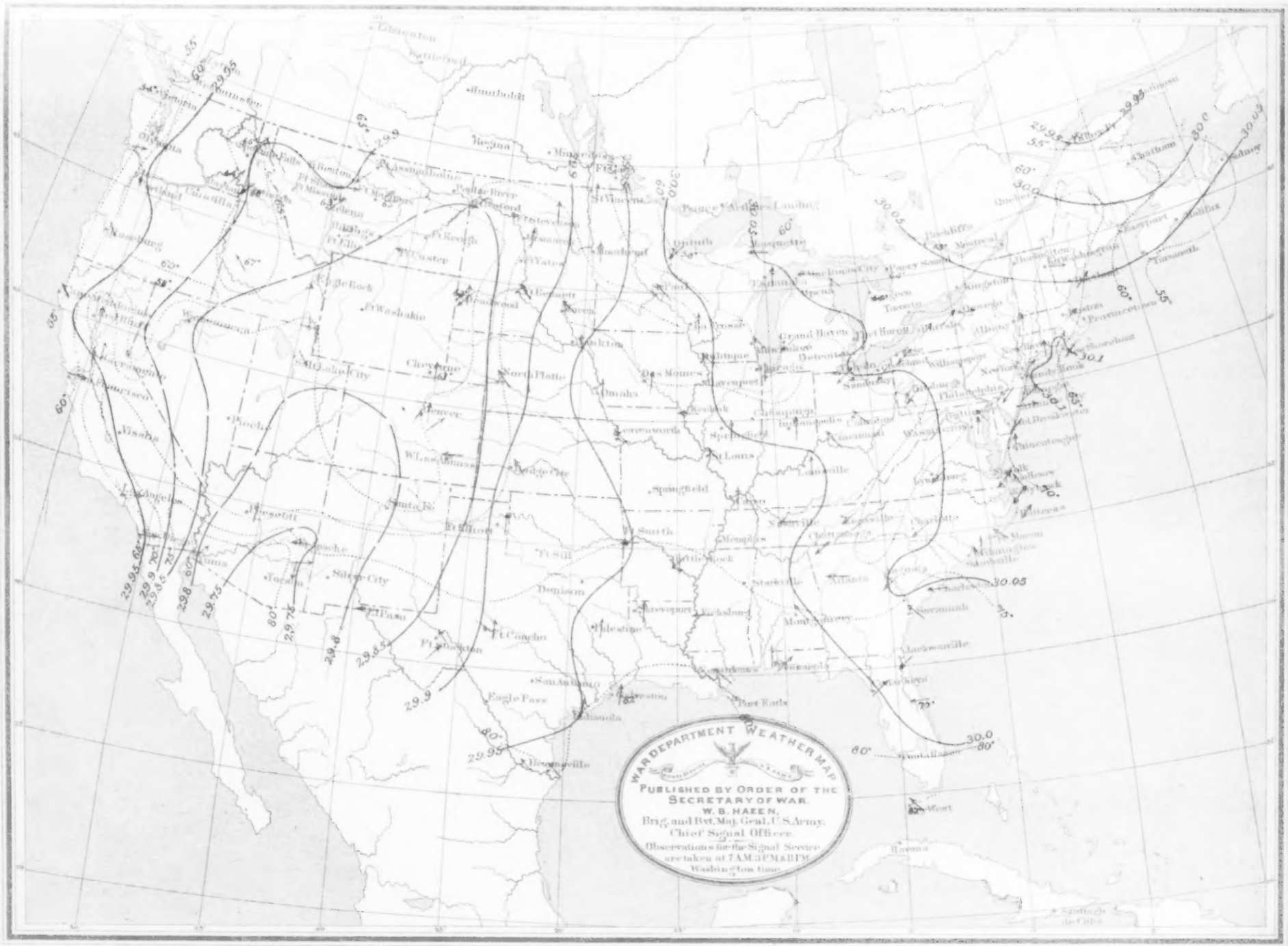


Chart II. Isobars, Isotherms, and Winds. June, 1883.

Chart II. Isobars, Isotherms, and Winds. June, 1883.

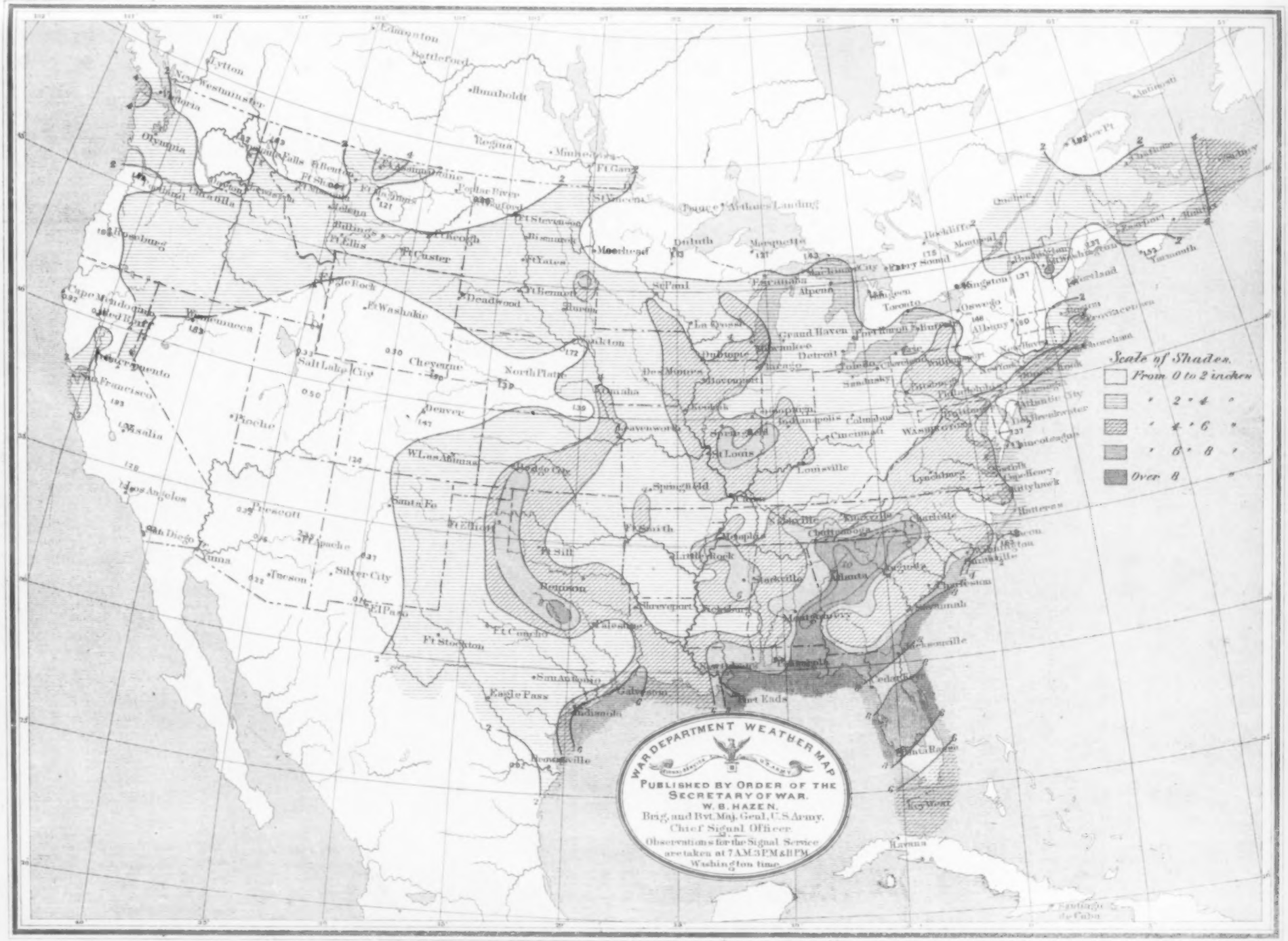

WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Genl. U. S. Army,
Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. Washington time.

Form 109 P

Chart III. Precipitation, June, 1934.

Form 106 F.

Chart III. Precipitation, June, 1884.


Scale of Shades.
From 0 to 2 inches
" 2 " 4 "
" 4 " 6 "
" 6 " 8 "
Over 8 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
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Signal Office Lith.